ANNUAL ACTIVITIES REPORT

March 2, 2016

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INTRODUCTION

The mission of the Agency for Healthcare Research and Quality (AHRQ) is to produce evidence to make health care safer, higher quality, more accessible, equitable, and affordable, and to work with the U.S. Department of Health and Human Services (HHS) and other partners to make sure that the evidence is understood and used.

AHRQ promotes health care quality improvement by conducting and supporting health services research that develops and presents scientific evidence regarding all aspects of health care. Health services research addresses issues of organization, delivery, financing, utilization, patient and provider behavior, quality, outcomes, effectiveness, and cost. This research evaluates clinical services and the systems in which these services are provided. It also addresses both basic and applied research questions, including key aspects of individual and system behavior, as well as the application of interventions in practice settings.

The AHRQ-sponsored Healthcare Cost and Utilization Project (HCUP, pronounced "H-Cup") is a vital resource, helping the Agency achieve its research agenda and thereby furthering its goal of improving the delivery of health care in the United States.

AHRQ releases the HCUP Annual Activities Report each spring to describe HCUP accomplishments in the previous year and to detail current plans for the upcoming year. This report is intended to inform HCUP Partners about project activities and ways in which HCUP data currently are used.

Overview of the HCUP Project

HCUP is a family of databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by AHRQ. HCUP databases are derived from administrative data and contain encounter-level, clinical and nonclinical information including all-listed diagnoses and procedures, discharge status, patient demographics, and charges for all patients, regardless of payer (e.g., Medicare, Medicaid, private insurance, uninsured). HCUP data collection began in 1988. These databases enable research on a broad range of health policy issues, including cost and quality of health services, medical practice patterns, access to health care programs, and outcomes of treatments at the national, State, and local market levels.

The HCUP databases are based on the data collection efforts of organizations in participating States that maintain statewide data systems and are Partners with AHRQ.
HCUP databases include the following:

- **National (Nationwide) Inpatient Sample (NIS)** is the largest publicly available, all-payer inpatient health care database in the United States. The 2012 National Inpatient Sample (NIS) was redesigned to improve national estimates. It contains a sample of inpatient discharges representing approximately 20 percent of the total discharges from

U.S. community hospitals. The previous NIS contained all discharge records from a sample of hospitals participating in HCUP.

- **Kids' Inpatient Database (KID)** is the only all-payer database for children in the United States. The KID contains a nationwide sample of pediatric inpatient discharges for patients younger than 21 years of age and is produced every 3 years.
- **Nationwide Emergency Department Sample (NEDS)** is the largest all-payer emergency department (ED) database in the United States. The NEDS includes discharge data on ED visits from a nationwide sample of 947 hospitals. It captures information for both treat-and-release visits and visits resulting in a hospital admission.
- **Nationwide Readmissions Database (NRD)** is a new database that can be used to create national readmission rates. The NRD addresses the need for nationally representative information on hospital readmissions.
- **State Inpatient Databases (SID)** contain the universe of inpatient discharges from participating States. The data are translated into a uniform format to facilitate multi-State comparisons and analyses. Together, the SID encompass about 97 percent of all U.S. community hospital discharges.
- **State Ambulatory Surgery and Services Databases (SASD)** include encounter-level data for ambulatory surgery and other outpatient services from hospital-owned facilities. In addition, some States provide ambulatory surgery and outpatient services from nonhospital-owned facilities.
- **State Emergency Department Databases (SEDD)** contain data from hospital-affiliated EDs for visits that do not result in hospitalizations. The SEDD files include all patients, regardless of payer, providing a unique view of ED care in a State or in a defined market over time.

Supplemental files for use with HCUP databases include the following:

- **Cost-to-Charge Ratio Files (CCR Files)** are hospital-level files that facilitate the conversion of inpatient total charges to total costs.
- **Price-to-Charge Ratio Files (PCR Files)** were created for intramural use at AHRQ. These ratios relate the total payment for care to the amount hospitals charge for delivering that care.
- **Hospital Market Structure Files (HMS Files)** are hospital-level files that contain various measures of hospital market competition. These measures are aggregate and are meant to provide a broad characterization of the intensity of competition that hospitals may be facing under various definitions of market area.
- **Kids' Inpatient Database Trend Weights (KID-Trend Weights) File** is a discharge-level file that provides KID data users with trend weights that are consistently defined from 1997 through later years.
- **1993–2002 Nationwide Inpatient Sample (NIS) Supplemental Discharge-Level Files** facilitate analysis of trends using multiple years of NIS data. To adjust for changes to the NIS design and data elements prior to 2002, the 1993–2002 NIS Supplemental Discharge-Level Files provide Trend Weights as well as data elements that are defined consistently across data years. To adjust for changes in the 2012 NIS design, AHRQ developed new **1993–2011 NIS Trend Weights (NIS-Trend Weights) Files** for analyses spanning 2012 and earlier NIS data. The new NIS Trend Weights replace the

earlier 1988–1997 NIS Trend Weights, which adjusted for changes following the 1998 NIS redesign.

- **Supplemental Variables for Revisit Analyses** are discharge-level files designed to facilitate analyses that track patients within a State as well as across time and hospital settings (inpatient, ED, and ambulatory surgery) while adhering to strict privacy guidelines. Beginning with the 2009 data year, the revisit variables are included in the SID, SASD, and SEDD databases and are no longer released as a supplemental file.

Highlights of 2015

In 2015, HCUP focused on expanding the type and number of data projects and resources available to researchers and policymakers. Project achievements during 2015 included the following:

Databases and Software Tools

- HCUP produced and released the 2013 NIS, NEDS, and NRD.
- HCUP created the 2014 SID, SASD, and SEDD.
- HCUP continued to release the State Databases via the Central Distributor. The Central Distributor released 40 State Databases in 2015.
- HCUP made progress on the goal of producing more timely information, using quarterly data for 2014–2015 from 17 HCUP Partners to generate projections and to identify utilization and outcome changes.
- HCUP introduced an online Data Use Agreement (DUA) as part of an ongoing effort by AHRQ to streamline the application process for HCUP databases through the online HCUP Central Distributor. The terms and conditions of the DUA remain the same, and acknowledgement of the DUA continues to be required for each purchase.
- AHRQ made a number of updates to HCUPnet—HCUP's free, online query system—to account for 2013 State and Nationwide Database releases. In addition, HCUPnet now includes information on ambulatory surgery.
- AHRQ developed enhancements on HCUPnet to the Community-Level Statistics query path. Enhancements included the addition of 2013 data for participating States, county-level Pediatric Quality Indicators (PDIs), downloadable results in the form of Microsoft® Excel files that will include the Federal Information Processing Standards (FIPS) codes for all counties, a mapping feature, time-aggregated statistics across 3 years of data, U.S.–Mexico border regional statistics, and statistics by region.
- HCUP released (with Partner approval) the 2013 CCR Files that contain hospital-specific, cost-to-charge ratios based on all-payer inpatient cost for nearly every hospital in the corresponding NIS, SID, NRD, and KID.
- AHRQ released HCUP Fast Stats in July 2015. HCUP Fast Stats is a tool on the HCUP-US Web site that provides easy access to the latest health information statistics based on HCUP data. The first topic in HCUP Fast Stats is the *Effect of Medicaid Expansion on Hospital Use*. The second topic in HCUP Fast Stats, *National Hospital Utilization and Costs*, launched in December 2015.

Reports and Analyses

- HCUP continued to produce the Statistical Briefs series on the HCUP User Support (HCUP-US) Web site, releasing 12 Statistical Briefs. The Statistical Briefs covered

topics such as hospital readmissions involving psychiatric disorders, characteristics of hospital stays for superutilizers by payer, potentially preventable pediatric hospital inpatient stays for asthma and diabetes from 2003–2012, and all-cause readmissions by payer and age from 2009–2013.

- HCUP produced two Projections Reports using historical data from HCUP States and projections from available quarterly and annual data. The Projections Reports included an update on *Clostridium Difficile Hospitalizations 2004–2015* and projections of *Acute Myocardial Infarction (AMI) and Acute Stroke, 2004–2015*.
- HCUP released two HCUP Infographics: (1) *Inpatient vs. Outpatient Surgeries in U.S. Hospitals, 2012*, which presents a visual representation of key points from HCUP Statistical Brief #188, *Surgeries in Hospital-Owned Outpatient Facilities, 2012* and (2) *Neonatal and Maternal Hospital Stays Related to Substance Use, 2006–2012,* which presents a visual representation of key points from HCUP Statistical Brief #193, *Neonatal and Maternal Hospital Stays Related to Substance Use, 2006–2012.*
- Beginning with the 2014 report, the *National Healthcare Quality Report and National Healthcare Disparities Report* have been combined into a single report, the National Healthcare Quality and Disparities Report. This release represents the twelfth annual report. It includes national and State-level HCUP data from 2011. State-level estimates from the 2014 Quality and Disparities (QDR) report are available on QRDRnet (http://nhqrnet.ahrq.gov/).
- AHRQ provided estimates of selected AHRQ Quality Indicator (QI) measures using 2013 HCUP data for the development of the next annual QDR, which is expected to be released in early 2016.
- HCUP released nine Methods Series reports. The Methods Series reports covered topics such as missing data methods for the NIS and SID, methods for applying the AHRQ QIs to HCUP Data for the 2014 QDR, the identification of observation services in HCUP State Databases, an examination of present-on-admission (POA) indicators in the HCUP SID, and an update to the examination of expected payer coding in HCUP databases.

Presentations and Outreach

- The User Support team showcased HCUP resources via presentations, Webinars, and exhibit booths at 20 venues. These settings accounted for a total of 36 presentations (including posters, Webinars, and trainings) and 11 exhibits.
- HCUP presented four HCUP data users' workshops for health services researchers at four different venues throughout the year. Attendees received hands-on experience using the HCUP databases and related tools.
- In the spring and fall, HCUP hosted a two-part Webinar series on HCUP databases, products, and tools.
- In the winter, HCUP hosted a two-part Webinar series on the 2013 HCUP NRD.
- HCUP presented the HCUP Outstanding Article of the Year Award at the 2015 AcademyHealth Annual Research Meeting.
- HCUP updated two trainings from the HCUP Online Tutorial Series, the *Multi-year Analysis Tutorial* and *Producing National HCUP Estimates*, to account for the redesign of the 2012 NIS. In addition, HCUP added the *Nationwide Readmissions Database*

Tutorial, which was created for researchers who are interested in using the HCUP NRD to produce national readmission estimates.

- HCUP released four quarterly newsletters to provide a summary of quarterly activities.
- HCUP provided monthly updates for HCUP-US Events and Product Release Calendars.

Partnership Activities and Resources

- AHRQ held quarterly Webinars with HCUP Partners to inform and involve Partners in the design and direction of the project. Meeting minutes, slides, and additional resources for HCUP Partners Meetings are available on the Partner section of the HCUP-US Web site.
- HCUP held a Webinar with a Partner workgroup in 2015. The Partner Collection and Reporting of Payer Data workgroup provided a forum for HCUP Partners to gather feedback about their data organizations' activities related to payer coding. The National Association of Health Data Organizations (NAHDO) facilitated these discussions.
- HCUP developed the 2013 Border Crossing Report, which provides information on the flow of patients into and out of HCUP States.
- AHRQ contacted Partners to notify them about plans to electronically disseminate HCUP Nationwide Databases through the HCUP Central Distributor.
- HCUP continued to provide Partners with technical support, software tools, and reports designed to enhance the collection and use of inpatient and outpatient data.

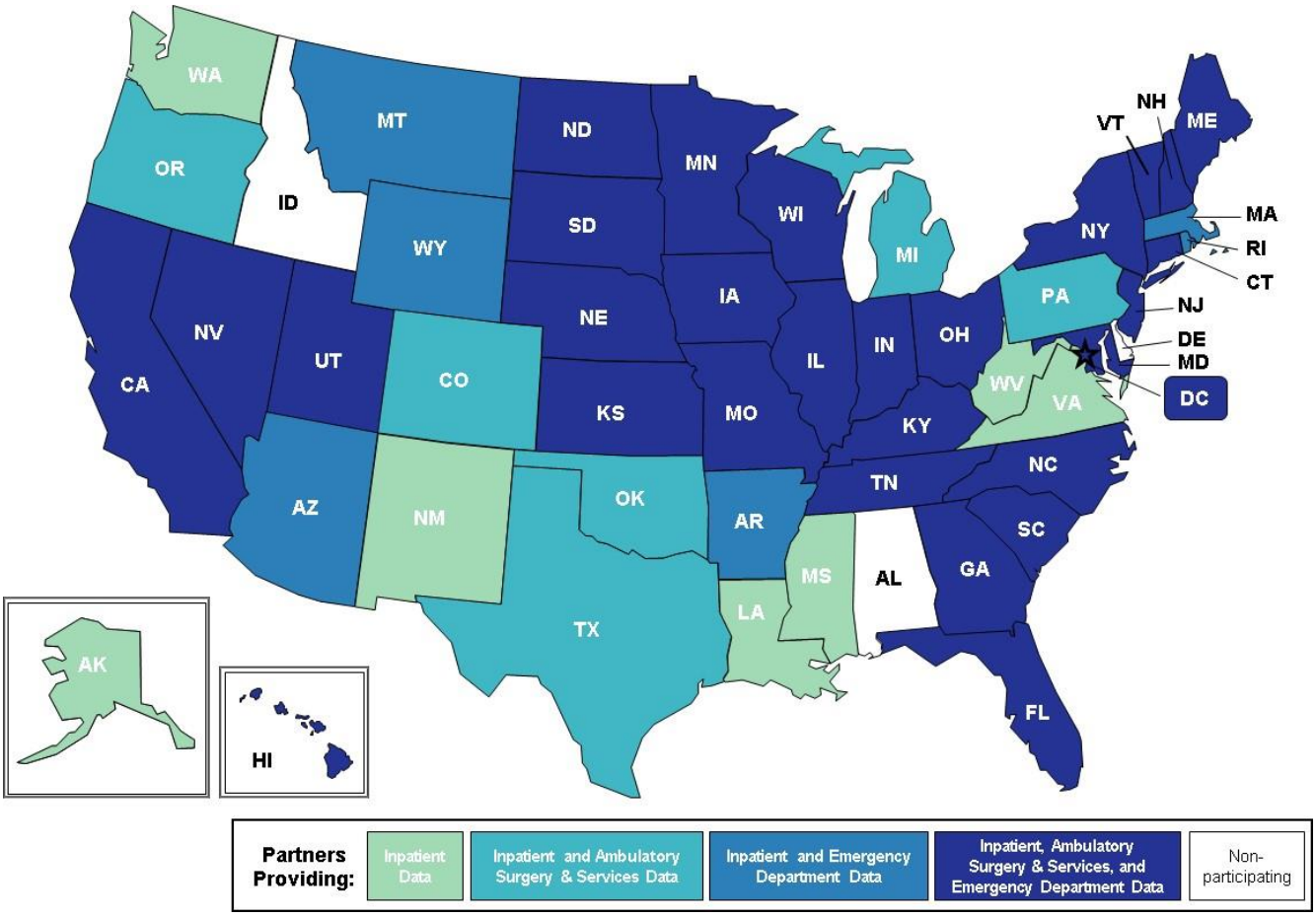
Objectives for 2016

The current status of States participating in HCUP data collection and a description of the types of data they provide are displayed in the figure. In 2016, HCUP will continue to expand the number of databases, tools, and reports as part of our commitment to ensure that HCUP remains a unique and valuable resource for health services research. We remain committed to supporting communication among HCUP Partners as well as between Partners and AHRQ. During the coming year, the project goals are to accomplish the following:

- Produce and release the 2014 NIS, NRD, and NEDS.
- Complete the 2014 SID, SASD, and SEDD and begin production of 2015 State Databases as participating Partner organizations complete and release their annual data files.
- Continue to produce HCUP Statistical Briefs—a series of online reports available on the HCUP-US Web site that are designed to summarize HCUP data for policy and nontechnical audiences.
- Continue to release HCUP Projections using historical inpatient data to create national estimates on health priorities for more recent time periods.
- Continue to produce HCUP Infographics on additional topics.
- Expand the collection of quarterly data from additional States to produce timely information.
- Generate estimates using HCUP data for the National Healthcare Quality and Disparities Report (QDR).

- Conduct research and analyses using HCUP data to explore the impact of changes in health policy, to analyze trends, and to evaluate structural and clinical factors on health care outcomes.
- Enhance the Community-Level Statistics query path on HCUPnet.
- Develop additional topics for HCUP Fast Stats and update existing topics quarterly or annually as newer data become available.
- Redesign the query paths and overall appearance of HCUPnet.
- Initiate communication with HCUP Partners regarding the availability of hospital attribute information at the State hospital identifier level with the underlying goal of enhancing how hospitals are identified and recorded across data years.
- Begin five new HCUP studies that cover the Medicare Hospital Readmissions Reduction Program (HRRP); changes in utilization, market share, and performance of safety-net versus nonsafety-net hospitals; characterizing inpatient and emergency department visits for an opioid-related diagnosis; effects of Medicare Advantage enrollment on Medicare utilization; and use of hospital services before and after implementing the Affordable Care Act.

HCUP Partner Participation by Data Type



HEALTHCARE COST AND UTILIZATION PROJECT

In 2015, AHRQ completed the third year of its current 5-year HCUP contract. The scope of the HCUP contract builds on and maintains a strong foundation of valuable data, useful analytic tools, and important partnerships with State data organizations, hospital associations, and private data organizations.
HCUP's objectives are to accomplish the following:

- Create and enhance a powerful source of national, State, and all-payer health care data.
- Produce a broad set of software tools and products to facilitate the use of HCUP and other administrative data.
- Enrich a collaborative partnership with statewide data organizations aimed at increasing the quality and use of health care data.
- Conduct and translate research to inform decisionmaking and improve health care delivery.

The current plan focuses on the following strategies to increase the impact of HCUP:

- Maintain a strong core while enhancing data tools and measures.

- Improve the value of HCUP by producing and disseminating information derived from the data.
- Explore additional data and linkages that would enable HCUP to examine a wider set of health care encounters.
- Place greater emphasis on and capacity for research analyses that use the breadth and depth of HCUP data to explore the impact of changes in health policy on health care. HCUP data allow researchers to document and analyze explanations for trends in health care and to propose and test hypotheses about the relative importance and impact of a variety of structural and clinical factors on health care outcomes, among other topics.
- Emphasize the importance of data partnerships.
- Expand outpatient data.

The HCUP Partners Meetings were held on a quarterly schedule in 2015. This series of Webinars took the place of the annual HCUP Partners Meeting that previously was held in person. Partners were invited to provide input regarding their priorities, to suggest possible changes for the project, and to discuss current data activities in their organizations. AHRQ shared challenges and accomplishments of the project as well as upcoming plans and initiatives. Many interesting topics were reported, such the variation in observation services data across the HCUP States, an introduction and demonstration of HCUP Fast Stats, and a first look at the *International Classification of Diseases, Tenth Revision* (ICD-10). In 2016, AHRQ will continue the HCUP Partners Meetings by Webinar. Notes from the HCUP Partners Meetings are available on the password-protected Partners section of the HCUP-US Web site: http://www.hcup-us.ahrq.gov/login.jsp. AHRQ places great value on Partner input and will continue to seek Partner guidance on the use and development of HCUP data.

SUMMARY OF HCUP ACTIVITIES FOR 2015

AHRQ conducts exploratory studies using HCUP data to examine current health research topics and to identify areas for further data refinement. The studies described in this section were in response to carefully selected topics that are consistent with the AHRQ research agenda. AHRQ develops this agenda in consultation with many agencies within HHS and with prominent health care organizations and institutions. AHRQ's research agenda reflects current priorities and emerging policy issues.

AHRQ also consults with industry experts, public officials, and other researchers to select topics for study. Finally, AHRQ solicits advice from data organizations participating in HCUP concerning product development and research.

In addition to exploratory studies conducted by the HCUP team, HCUP produces software tools and supplemental files to further enhance the administrative databases and to improve their value and ease of use. HCUP also produces methods reports including statistics, findings, and special technical analyses aimed at communicating and disseminating information about HCUP data. Additional information about HCUP software tools, supplemental files, and data reports is provided in the HCUP Project Overview Binder.

Finally, AHRQ researchers use HCUP data to conduct their own research and to engage in collaborations intended for publication in peer-reviewed journals or disseminated through other mediums. AHRQ conducts specific studies using HCUP data in collaboration with other Federal agencies, including the Centers for Disease Control and Prevention (CDC), the Food and Drug

Administration (FDA), and the Substance Abuse and Mental Health Services Administration (SAMHSA). In these instances, an AHRQ HCUP team member works with a colleague at another agency, bringing together expertise in knowledge areas and respective data resources. All collaborations using HCUP data are conducted under the supervision of the AHRQ HCUP researcher.

In 2015, AHRQ investigated numerous HCUP-related topics with the dual goals of developing data for research use and exploring health outcomes to inform policy decisions. Studies that began in 2015 or began earlier but changed significantly in 2015 are listed below. The databases used in these studies are shown in parentheses.

Studies Using State Databases

- Acute Care Revisits After Ambulatory Surgery (SID, SASD, SEDD)
- Adverse Drug Events as Hospital-Acquired Conditions (SID)
- Age-Related Disparities in Access to Trauma Centers for Patients With Severe Head Injuries Following the Release of the Updated Field Triage Guidelines (SID, SEDD)
- Changes in Hospital Inpatient Utilization Following the Affordable Care Act Medicaid Coverage Expansion (SID)
- Characteristics of Hospitals With High and Low Cost Efficiency (SID)
- Chest Pain: Admissions After Discharge From an Emergency Department (SID, SEDD)
- Comorbidity Indices for Identifying Increased Risk of Hospital Readmissions and In-Hospital Mortality Using Hospital Administrative Data (SID)
- Development and Validation of an Agency for Healthcare Research and Quality Indicator for Mortality After Congenital Heart Surgery, Harmonized With Risk Adjustment for Congenital Heart Surgery (RACHS-1) Methodology (SID)
- Differences in Use of High- and Low-Quality Hospitals Among Working-Age Americans by Insurance Type (SID)
- Does Health Information Exchange Move Patients More Quickly Through Emergency Departments? (SEDD)
- Effect of Retail Clinics on Emergency Department Utilization for Low-Acuity Conditions (SEDD)
- Effect of Smoke-Free Laws on Acute Care Hospitalization (SID)
- Effect of TeamSTEPPS Training on Inpatient Care (SID)
- Epidemiology of Hospital-Associated Invasive Candidiasis in the United States (SID)
- Epidemiology of Sarcoidosis-Associated Hospitalizations in the United States, 1993–2013 (SID)
- Features of Prescription Drug Monitoring Programs and Their Relationship to Hospital Utilization for Opioid-Related Diagnoses (SID, SEDD)
- Geographic Variation in Uninsurance and Changes in Hospital Utilization Following the Affordable Care Act (SID)
- Health Effects of Climate Change (SID, SEDD)
- Impact of Multiple Chronic Conditions on the Cost of Hospital Stays (SID)
- Impact of Penalties in the Hospital Readmission Reduction Program (SID)
- Impact of Race/Ethnicity and Socioeconomic Status on Risk-Adjusted Hospital Readmission Rates Following Hip and Knee Arthroplasty (SID)
- Impact of Race/Ethnicity and Socioeconomic Status on Risk-Adjusted Hospital Readmission Rates: Implications for the Centers for Medicare & Medicaid Services Hospital Readmissions Reduction Program (SID)
- Inpatient Admissions From the Emergency Department for Adults With Injuries: The Role of Clinical and Nonclinical Factors (SEDD)

- Length of Stay in Emergency Departments: Variation Across Classifications of Clinical Condition and Patient Discharge Disposition (SID, SEDD)
- Marginal Hospital Cost of Surgery-Related, Hospital-Acquired Pressure Ulcers (SID)
- Medicare Advantage Versus Traditional Medicare: Effect on Hospital Admission Rates (SID)
- Pathways Through Hospital-Based Acute Care: Shifts From Inpatient to Outpatient Settings Are Occurring Regardless of Payer (SID, SASD, SEDD)
- Racial/Ethnic Disparities in In-Hospital Surgical Complications and Mortality Outcomes (SID)
- Racial/Ethnic Disparities in Readmissions in U.S. Hospitals: The Role of Insurance Coverage (SID)
- Trends in the Markets of Safety-Net and Nonsafety-Net Hospitals (SID)
- Validating Cost Estimates Based on Cost-to-Charge Ratio Files in Healthcare Cost and Utilization Project Data (SID, SEDD)

Studies Using Nationwide Databases

- Comparison of Pediatric Discharge Estimates From the Healthcare Cost and Utilization Project (HCUP) Kids' Inpatient Database (KID) and National Inpatient Sample (NIS) (KID, NIS)
- Effect of Outdoor Pollution on Health Care Utilization for Common Childhood Pulmonary Conditions (NIS, NEDS)
- Emergency Department Visits by Children and Young Adults With Diabetes, 2012 (NEDS)
- Population-Based Trends in Pediatric Cardiac Surgery and Interventional Cardiology Procedures in the United States (KID)
- The Role of Medical Complications and Comorbidities in the Cost of Inpatient Stays for Alcoholic Liver Disease in the United States (NIS)
- Using the HCUP National Inpatient Sample (NIS) to Estimate Trends (NIS)

Studies Using Both Nationwide and State Databases

- Emergency Department Visits for Severe Pediatric Injuries: Effect of Hospital Trauma Level on Rate of Admissions (NEDS, NIS, SID, SEDD)
- National Healthcare Quality and Disparities Reports (QDR) Special Analyses (SID, SEDD, NIS, NEDS)

Ongoing Studies

- National Healthcare Quality and Disparities Report (QDR)

Descriptions of these studies are provided below.

Studies Using State Databases

Acute Care Revisits After Ambulatory Surgery

Introduction: Two-thirds of operations are performed on an outpatient basis, yet little research has assessed their quality. This study determined the rates of all-cause, unplanned revisits (i.e., not for routine medical care) within 30 days of ambulatory surgery and assessed whether revisits were related to the operation. **Methods:** Data were from the Agency for Healthcare

Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2010–2011 State Ambulatory Surgery and Services Databases (SASD), State Inpatient Databases (SID), and State Emergency Department Databases (SEDD) for seven States. We performed a retrospective analysis of six low- to moderate-risk ambulatory operations spanning a range of specialties and complexity. Unique, encrypted patient numbers allowed linkage of the ambulatory operations with 30-day postoperative, unplanned acute care visits. We used the first-listed diagnosis code to categorize the reason for the revisit as a complication related to the operation or an unrelated condition. We developed the categories iteratively using a combination of prospective and empiric methods. **Results:** There were 482,034 ambulatory operations and 45,760 all-cause 30-day revisits (94.9 per 1,000 operations). Most revisits were to the emergency department (58.7 per 1,000), followed by inpatient and ambulatory surgery settings (27.0 and 9.2 per 1,000, respectively). Across all operations and settings, up to one-third of all revisits were unrelated conditions (29.7 per 1,000) and two-thirds were complications related to the index operation (65.2 per 1,000). This study was published in JAMA as a Research Letter: Steiner CA, Maggard-Gibbons M, Raetzman SO, Barrett ML, Sacks GD, Owens PL. Return to acute care following ambulatory surgery. JAMA. 2015 Oct 6;314(13):1397-1399.

Claudia A. Steiner, M.D., M.P.H., Melinda Maggard-Gibbons, M.D., M.S.H.S., Susan O. Raetzman, M.S.P.H., Marguerite L. Barrett, M.S., Greg D. Sacks, M.D., M.P.H. and Pamela L. Owens, Ph.D.

Adverse Drug Events as Hospital-Acquired Conditions

Purpose: The Centers for Medicare & Medicaid Services (CMS) and the Office of the National Coordinator for Health Information Technology established Meaningful Use (MU) Incentives under the Health Information Technology for Economic and Clinical Health (HITECH) Act. One goal of Stage 1 (MU1) is to encourage hospitals to adopt electronic medical records. The records include tracking of adverse drug events. Many of the Hospital Engagement Networks are also seeking to track these events; however, no assessment has been made to determine if Healthcare Cost and Utilization Project (HCUP) data can be used for this purpose. We examined whether (1) adverse drug events can be classified as hospital-acquired conditions and (2) the use of MU1 electronic medical records reduces these events. **Methods:** We used State Inpatient Databases (SID) (2008–2012) for Arkansas, Arizona, California, Florida, Georgia, Hawaii, Illinois, Iowa, Kentucky, Maine, Michigan, Minnesota, Nebraska, Nevada, New Jersey, New York, Oregon, South Dakota, and Tennessee. We will conduct hospital fixed effect methods. We are augmenting AHA information technology (IT) data with Healthcare Information and Management Systems Society (HIMSS) IT data and with Surescripts® Hospital Referral Region (HRR) IT data on physician e-prescribing characteristics by geographic region. Surescripts, an e-prescribing network, links by geographical market, HRR. Surescripts is an e-prescription network used by the majority of all community pharmacies in the U.S. routing prescriptions, excluding closed systems such as Kaiser Permanente. This includes chain, franchise, and independently owned pharmacies. Surescripts network data exclude controlled substances.

William Encinosa, Ph.D., Jaeyong Bae, M.A., and Michael F. Furukawa, Ph.D.

Age-Related Disparities in Access to Trauma Centers for Patients With Severe Head Injuries Following the Release of the Updated Field Triage Guidelines

Introduction: Two field triage guidelines indicating direct transport to a Level I or II trauma center (TC) were introduced in 2011: (1) systolic blood pressure <110 for patients older than 65 years, and (2) injuries from low-impact mechanisms for patients older than 55 years. This study investigates the effects of the new guidelines on TC designation. **Methods:** We used a pre–

post design to analyze Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) data from 2009 and 2012 State Emergency Department Databases (SEDD) and State Inpatient Databases (SID). We considered the trauma designation of the emergency department (ED) where treatment was initiated as well as changes in the trauma designation of the initial treating ED following introduction of revised field triage guidelines. **Results:** After multivariable adjustment, age-based disparities were found in 2009 and 2012, with TC care less likely for adults aged 45–64 (odds ratio [OR]: 0.76 and 0.74), 65–84 (OR: 0.61 and 0.59), and 85 years or older (OR: 0.53 and 0.56). Comparing 2012 to 2009, the likelihood of TC care increased for all age groups, with the largest increase among individuals aged 85 years and older (OR=1.18) followed by adults aged 18–44 years (OR=1.12). Rates of initial treatment at a TC increased for all age groups, particularly among those aged 85 years and older; however, age-based disparities persisted. **Conclusion:** The results indicate that progress in TC designation has been made, but there is a continuing need for improvement. **Thomas J. Flottemesch, Ph.D., Susan O. Raetzman, M.S.P.H., Kevin Heslin, Ph.D., Katie Fingar, Ph.D., Rosanna M. Coffey, Ph.D., Marguerite L. Barrett, M.S., and Ernest Moy, M.D., Ph.D.**

Changes in Hospital Inpatient Utilization Following the Affordable Care Act Medicaid Coverage Expansion

Introduction: The purpose of this study was to estimate effects of the Affordable Care Act Medicaid expansion on hospital inpatient volumes and outcomes for all payers, Medicaid, and the Uninsured. **Methods:** Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2011–2014 State Inpatient Databases (SID) for 20 States (Arizona, California, Colorado, Hawaii, Iowa, Kentucky, Michigan, New Jersey, New York, Oregon, Vermont, Florida, Indiana, Kansas, Missouri, Montana, South Dakota, Tennessee, Virginia, and Wisconsin); State population estimates from the Census Bureau; and unemployment rate estimates from the Bureau of Labor Statistics. A difference-in-differences regression design estimated Medicaid expansion affects using cross-State variation in outcomes for all payers, Medicaid, and the uninsured. Outcomes were admission volumes, chronic condition admission percentages, discretionary and preventable hospitalization percentages, length of stay, estimated cost, and a case-mix index. Expansion effects, estimated using regression models, represented percentage changes in outcomes in expansion States compared with nonexpansion States before and after the Medicaid expansion. **Results:** Admission volume expansion effects for all-payers mainly were small and insignificant; those for Medicaid were large, positive and significant; and those for the uninsured were large, negative and significant. Uninsured expansion effects for chronic condition percentages were negative and significant; those for Medicaid and all-payers were inconsistent or insignificant. Expansion effects for discretionary admission percentages among Medicaid patients and the uninsured were positive and significant, whereas those for all payers was small and insignificant. Uninsured expansion effects for preventable admission percentages were negative and significant; expansion effects for Medicaid and all payers were small and insignificant. For the uninsured, expansion effects of length of stay, cost, and the case-mix index were significant and negative. Corresponding expansion effects for Medicaid were inconsistent and smaller, and there were no significant all-payer expansion effects for any of these metrics. **Conclusion:** We confirmed the hypothesis that admission volumes would increase for Medicaid while uninsured admissions would decline. However, expansion effects for total admission volumes were small and not statistically significant, which was contrary to expectation. Results for uninsured admissions and other outcomes suggest that people with chronic conditions, those at highest risk for preventable hospitalizations, and those consuming the most hospital resources were differentially likely to transfer from uninsured into Medicaid or private coverage. One

explanation consistent with our findings is that Medicaid has no impact on inpatient utilization relative to the uninsured, and compositional changes in uninsured and Medicaid admissions are purely driven by selection.
Eli Cutler, Ph.D., Michael Dworsky, Ph.D., Christine Eibner, Ph.D., Sharat Iyer, M.D., Zeynal Karaca, Ph.D., Brian J. Moore, Ph.D., Gary Pickens, Ph.D., and Herbert S. Wong, Ph.D.

Characteristics of Hospitals With High and Low Cost Efficiency

Introduction: Improved hospital cost efficiency can bend the cost curve without adversely affecting access or quality. The goal of this study was to examine characteristics of hospitals with high and low cost efficiency. **Methods**: We used Stochastic Frontier Analysis (SFA) to estimate hospital cost efficiency in 37 States that participated in the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) in 2010. Our analysis focused on performance measures, hospital characteristics, and market variables of the top and bottom tertile of general, acute care hospitals as ranked by cost efficiency (cut-off points were efficiency scores of 97.04 percent and 70.03 percent). **Results:** Compared with the least efficient hospitals, highly efficient hospitals tended to have lower average costs, use fewer employees, and earn higher profits. The most efficient hospitals tended to be nonteaching, for-profit, and members of multi-hospital systems. The highly efficient hospitals relied more on Medicare but less on Medicaid than their less efficient counterparts. Hospitals in the most efficient group were located in areas with a lower health maintenance organization (HMO) penetration rate and less competition. The latter result is consistent with service-based competition.
Herbert S. Wong, Ph.D. and Michael Rosko, Ph.D.

Chest Pain: Admissions After Discharge From an Emergency Department

Introduction: In 2012, over five million patients presented to the emergency department (ED) with chest symptoms (i.e., nonspecific chest pain or coronary atherosclerosis and other heart disease); over 85 percent of these visits did not result in hospital admissions. Not infrequently, patients return to the hospital within 30 days with the same or closely related symptoms and are admitted, raising questions about diagnostic performance, quality of care, and patient safety. Our study determines how often patients experience an inpatient admission for related symptoms after discharge from an ED for chest symptoms (subsequent admission) and describes patient characteristics associated with such events. **Methods**: Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2012 and 2013 State Inpatient Databases (SID) and State Emergency Department Databases (SEDD) from eight States (California, Florida, Missouri, Nebraska, New York, South Carolina, Tennessee, and Vermont). We identified over 1.8 million ED discharges for chest symptoms. From this population, 2.9 percent experienced potentially related subsequent admissions within 30 days: 3,709 (0.2 percent) for acute myocardial infarction (AMI), 32,710 (1.7 percent) for other cardiovascular conditions, 8,577 (0.5 percent) for respiratory conditions, and 11,785 (0.6 percent) for mental disorders. HCUP data were linked to the American Hospital Association (AHA) Annual Survey of Hospitals. **Results**: Multivariable logistic regression results showed higher odds of subsequent admission for older patients and those residing in low-income areas, whereas females and nonwhite racial/ethnic groups had lower odds. Compared with patients with private insurance, other patients (i.e., those covered by Medicare, Medicaid, other programs, or not covered by insurance) had higher odds of subsequent admission. Patients visiting EDs in teaching, large, and private nonprofit hospitals had lower odds of a subsequent admission. **Conclusion**: Compared with previous studies, our results show a more complete picture of patients presenting to the ED with chest symptoms by including multiple

diagnostic categories of subsequent admissions. In particular, we show a lower rate of subsequent admission for AMI than was reported previously. Our results identifying characteristics associated with increased odds of subsequent admission after ED discharge can be used by ED physicians and administrators to target at-risk populations.
Ernest Moy, M.D., M.P.H., Brian J. Moore, Ph.D., Kevin Heslin, Ph.D., and Rosanna M. Coffey, Ph.D.

Comorbidity Indices for Identifying Increased Risk of Hospital Readmission and In-Hospital Mortality Using Hospital Administrative Data

Introduction: The objective of this study was to extend the existing literature surrounding comorbidity indices by developing two indices. The indices are based on the Elixhauser Comorbidity measures designed to predict two frequently reported health outcomes using administrative data: in-hospital mortality and 30-day readmission. **Methods:** We used a large readmissions analysis file built from all-payer hospital administrative data in the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) from 2011 and 2012 for a total of 19 States (Arizona, Arkansas, California, Florida, Georgia, Hawaii, Louisiana, Massachusetts, Michigan, Missouri, Nebraska, New Mexico, New York, South Carolina, Tennessee, Utah, Vermont, Virginia, and Washington). HCUP data were linked to the American Hospital Association (AHA) Annual Survey of Hospitals. The final models were derived with bootstrapped replications of backward stepwise logistic regression models on each outcome. Odds ratios and index weights were generated for each Elixhauser comorbidity for both mortality and readmissions using 2012 data. The weights from both models were applied to create a single index score per record. Model validation was conducted with c-statistics using the same readmissions analysis file for the 2011 data year. **Results:** Our index scores performed as well as separate use of all 29 Elixhauser comorbidity variables. The c-statistic for our index scores without inclusion of other covariates was 0.7773 (95 percent confidence interval [CI] 0.7764–0.7781) for the mortality index and 0.6337 (95 percent CI 0.6332–0.6342) for the readmissions index. The readmission index was stable across multiple subsamples defined by either demographic characteristics or clinical condition. **Conclusion:** Our indices are likely to be an effective method of incorporating the influence of comorbid conditions in models designed to assess the risk of in-hospital mortality or readmission when using administrative data with limited clinical information.
Anne Elixhauser, Ph.D., Brian J. Moore, Ph.D., Susan White, Ph.D., R.H.I.A., C.H.D.A. Raynard Washington, Ph.D., M.P.H., and Natalia Coenen, M.P.H

Development and Validation of an Agency for Healthcare Research and Quality Indicator for Mortality After Congenital Heart Surgery, Harmonized With Risk Adjustment for Congenital Heart Surgery (RACHS-1) Methodology

Introduction: The National Quality Forum (NQF) previously approved a quality indicator that was developed by the Agency for Healthcare Research and Quality (AHRQ) for mortality after congenital heart surgery. Several parameters of the validated Risk Adjustment for Congenital Heart Surgery (RACHS-1) method were included, but other parameters were different. As part of the NQF endorsement maintenance process, developers were asked to harmonize the two methodologies to avoid confusion. **Methods:** Parameters that were identical between the two methods were retained. We used Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) from 2008 to select optimal parameters where differences existed, with a goal to maximize model performance and face validity. Inclusion criteria were not changed, and they included all discharges for patients younger than 18 years with *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) procedure codes for congenital heart surgery

or nonspecific heart surgery combined with congenital heart disease diagnosis codes. **Results:** The final model included procedure risk group, age (0–28 days, 29–90 days, 91–364 days, and 1–17 years), low birth weight (500–2499 grams), other congenital anomalies (Clinical Classifications Software [CCS] 217, except for 758.xx), multiple procedures, and transfer-in status. Among 17,945 eligible cases in the SID 2008, the c statistic for model performance was 0.815. In the SID 2013 validation data set, the c statistic was 0.821. Risk-adjusted mortality rates by center ranged from 0.9 to 4.1 percent (5th to 95th percentile). **Conclusions:** Congenital heart surgery programs now can obtain national benchmarking reports by applying AHRQ Quality Indicator software to hospital administrative data, based on the harmonized RACHS-1 method. The results have high discrimination and face validity.
Kathy Jenkins, M.D., M.P.H., Jennifer Koch Kupiec, M.P.H., Pamela L. Owens, Ph.D., Patrick Romano, M.D., M.P.H., Jeffrey J. Geppert, M.Ed., J.D. and Kimberlee Gauvreau, Sc.D.

Differences in Use of High- and Low-Quality Hospitals Among Working-Age Americans by Insurance Type

Introduction: Research suggests that individuals with Medicaid or no insurance receive fewer evidence-based treatments and have worse outcomes than those with private insurance for a broad range of conditions. The objective of this study was to determine whether these outcome differences were related to differences in hospital quality. **Methods:** We used Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) from 2009–2010 to identify patients aged 18–64 years with private insurance, Medicaid, or no insurance who were hospitalized with acute myocardial infarction, heart failure, pneumonia, stroke, or gastrointestinal hemorrhage. Multinomial logit regressions estimated the probability of admissions to hospitals classified as high, medium, or low quality on the basis of risk-adjusted, in-hospital mortality. **Results:** Compared with patients who had private insurance, those with Medicaid or no insurance were more likely to be minorities and to reside in areas with low socioeconomic status. The probability of admission to high-quality hospitals was similar (p=.62) for patients with Medicaid (23.3 percent) and private insurance (23.0 percent) but was significantly lower for patients without insurance (19.8 percent, p<.01) compared with the other two insurance groups. Accounting for demographic, socioeconomic, and clinical characteristics did not influence the results. **Conclusions:** Previously noted disparities in hospital quality of care for patients with Medicaid are not explained by differences in the quality of hospitals they use. Patients without insurance have less frequent use of high-quality hospitals; however, this finding needs further exploration using data from 2013 or later to determine the influence of the Affordable Care Act, which is designed to improve access to medical care for patients formerly without insurance.
Ioana Popescu, M.D., M.P.H., Rosanna M. Coffey, Ph.D., Raynard Washington, Ph.D., M.P.H., Kevin Heslin, Ph.D., Marguerite L. Barrett, M.S., Lucy H. Karnell, Ph.D., and José J. Escarce, M.D., Ph.D.

Does Health Information Exchange Move Patients More Quickly Through Emergency Departments?

Introduction: Emergency departments (EDs) are under pressure because of the operational challenges typified by the so-called "crowdedness epidemic" and their ever-increasing length of stay (LOS). Poor information coordination plays a key role in this phenomenon. In a poorly coordinated ED, it is common to have frequently missing radiological and laboratory records, lack of communication between the ED and the patient's primary care provider, and unavailability of the patient's medical history at the point of care. Health information exchanges (HIEs), electronic means of transferring patient records among different health care providers,

offer a possible solution. Although use of functional HIEs recently has increased, the circumstances in which HIE is effective in reducing the ED LOS remain poorly understood. The purpose of our study was to quantify the impact of HIEs on operational efficiency in EDs as measured by LOS. We took into account service load, service intensity, and organizational factors. **Methods:** We used the variation in HIE implementation across time and across hospitals to identify the role of the HIE on LOS through a difference-in-differences analysis. We constructed a rich panel of data, which was formed using four disparate datasets: (1) Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Emergency Department Databases (SEDD) from 2009–2011 for Massachusetts, (2) American Hospital Association (AHA) data, (3) the Health Information Management Systems Society (HIMSS) Analytics® database, and (4) Area Health Resource Files (AHRF). The SEDD include detailed information on procedures, diagnosis, patient demographics, charges, and the expected payment information for almost all the ED visits. We also had proprietary access to admission and discharge times for each of these visits, which made our dataset unique. We used AHA data to control for the hospital characteristics and the HIMSS database to track HIE and other information technology variables. Finally, we used the AHRF to control for county-level socioeconomic information. Our dataset had 2.45 million records from 55 EDs corresponding to more than 99 percent of all patient visits resulting in discharge. **Results:** We found that average ED LOS decreased by five to seven percent following HIE adoption. This effect diminished for patients treated in crowded settings or those who needed more intense treatment. **Conclusions:** The results of this research provide decisionmakers with vital information on tangible benefits of HIEs from an operational perspective. This quantitative information should help decisionmakers weigh the benefits of HIEs against their costs, and it should help hospital administrators make more informed decisions about implementing HIEs in EDs.

Zeynal Karaca, Ph.D., Mehmet Ayvaci, Ph.D., and Turgay Ayer, Ph.D.

Effect of Retail Clinics on Emergency Department Utilization for Low-Acuity Conditions

Introduction: Retail clinics have been promoted as a means of decreasing emergency department (ED) visits for low-acuity conditions, but whether they do so has never been assessed empirically. The purpose of this study was to evaluate whether the opening of retail clinics in ED catchment areas is associated with decreased ED utilization for 11 low-acuity conditions that can be treated at a retail clinic. **Methods:** Data came from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2006–2012 State Emergency Department Databases (SEDD) for patients with low-acuity conditions who were treated and released from an ED. The SEDD were combined with data from Merchant Medicine, a research and consulting firm specializing in the field of walk-in medicine. These data included the dates of opening and closing and geocoded addresses of all retail clinics in the United States. Other data sources included the American Hospital Association (AHA) Annual Survey for hospital characteristics and the Area Health Resource File (AHRF) for county-level characteristics. The study included 2,043 EDs in the 23 States that contributed emergency department data from 2006–2012. Poisson regression models examined the association between retail clinic penetration and the rate of ED visits for low-acuity conditions. We measured retail clinic *penetration* as the percentage of the ED catchment area (ZIP Codes that accounted for three-quarters of all ED visits for low-acuity conditions) that overlapped with the geographic area within a 10-minute drive from a retail clinic. The main outcome was the rate of treat-and-release ED visits per 1,000 ED visits for 11 low-acuity conditions. Results are forthcoming.

Grant Martsolf, Ph.D., M.P.H., R.N., Katie Fingar, Ph.D., M.P.H., Rosanna M. Coffey, Ph.D., Ryan Kandrack, B.S., Tom Charland, B.A., Christine Eibner, Ph.D., Anne Elixhauser, Ph.D., Claudia A. Steiner, M.D., M.P.H., and Ateev Mehrotra, M.D., M.P.H.

Effect of Smoke-Free Laws on Acute Care Hospitalization

Introduction: Public place smoking bans are reportedly associated with substantial reductions in smoking-related hospitalization rates. However, no national study of all age groups that accounts for contemporaneous controls including State cigarette taxes has been conducted. The objective of this study was to determine the impact of comprehensive public place smoking bans and State cigarette taxes on hospitalization rates for acute myocardial infarction (AMI), heart failure, and pneumonia. **Methods:** Data were from the Agency for Healthcare Research and Quality (AHRQ) State Inpatient Databases (SID) from 2001 through 2008. For this retrospective cohort study, we included all hospital discharges for AMI, heart failure, and pneumonia for individuals aged 18 years and older in 28 States. Exposures were (1) comprehensive public place smoking bans for restaurants, bars, and workplaces, at the city, county, or State level and (2) State taxes per cigarette pack. The main outcomes and measures were (1) county-level, per capita hospitalization rates for AMI, heart failure, and pneumonia, stratified by age categories, adjusted for local population demographics, health status, local health system capacity, and managed care penetration and (2) State cigarette pack taxes. Results are forthcoming.
Vivian Ho, Ph.D., Harlan Krumholz, Ph.D., and Claudia A. Steiner, M.D., M.P.H.

Effect of TeamSTEPPS Training on Inpatient Care

Introduction: Avoidance of adverse events remains a significant opportunity for improved care in the inpatient setting. Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) is a systematic, stepwise, evidence-based program developed collaboratively by the U.S. Department of Defense (DoD) Patient Safety Program and the Agency for Healthcare Research and Quality (AHRQ). Its goal is to develop a culture of safety among health care professionals. TeamSTEPPS leverages an evidence-based curriculum and training materials that emphasize improved teamwork and communication to improve patient safety across clinical settings including inpatient, primary care, and long-term care facilities. The purpose of this investigation is to analyze the impact of TeamSTEPPS training on inpatient care. **Methods:** Data from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2009–2013 State Inpatient Databases (SID) for 39 States were applied to patient safety outcomes of the AHRQ Patient Safety Indicators. We are examining the impact of TeamSTEPPS training on patient care in 2012 using time series and difference-in-differences methods. Results are forthcoming.
Teresa B. Gibson, Ph.D., Rosanna M. Coffey, Ph.D., Natalia Coenen, M.P.H., Raynard Washington, Ph.D., Claudia A. Steiner, M.D., M.P.H., Barbara Bartman, M.D. and Erin Grace, M.P.H.

Epidemiology of Hospital-Associated Invasive Candidiasis in the United States

Introduction: Invasive candidiasis, a fungal bloodstream infection (BSI) caused by *Candida* species, is a leading cause of nosocomial BSIs in the United States. Candidiasis is associated with high morbidity and mortality. It is common among immunocompromised hospitalized patients and those undergoing invasive medical procedures. Our goal was to describe the epidemiology of hospital-associated invasive candidiasis in the United States, including geographic variation and trends. **Methods:** We used the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases

(SID). We included 25 States with continuous reporting from 2002 through 2012, representing 72 percent of the United States population. We extracted inpatient discharge records with *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) codes for invasive candidiasis (112.5, 112.81, and 112.83) in the primary or secondary discharge diagnosis fields, excluding neonatal cases. Age, sex, hospitalization year, and State data were extracted. U.S. Census Bureau data were used as the denominator for State hospitalization incidence and trends. We used Poisson regression to assess significance of trends ($p<.05$). Results are forthcoming.
Sara Strollo M.P.H., Rebecca Prevots Ph.D., and Claudia A. Steiner, M.D., M.P.H.

Epidemiology of Sarcoidosis-Associated Hospitalizations in the United States, 1993–2013

Introduction: Sarcoidosis is a rare systemic granulomatous disease most often affecting the lungs. The national burden and epidemiology of this disease have not been well described. The purpose of this study was to describe the epidemiology of sarcoidosis-related hospitalizations in the United States. **Methods:** Data were from Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) from 2002 through 2012. We extracted data from the 12 States with continuous reporting of race data and ≥10 claims in white and black, age, and sex strata. We included claims that listed *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) code 135 in the primary or secondary diagnosis fields. We also extracted data on sex, age, race and primary discharge diagnosis for comorbid conditions. State-specific census data were used to estimate average annual incidence. Results are forthcoming.
Aprielle Wills, M.P.H., Rebecca Prevots, Ph.D., and Claudia A. Steiner, M.D., M.P.H.

Features of Prescription Drug Monitoring Programs and Their Relationship to Hospital Utilization for Opioid-Related Diagnoses

Introduction: Prescription drug monitoring programs (PDMPs) create State-run databases to monitor prescribing patterns indicative of prescription drug abuse. PDMP features vary by State, and there is limited research on their effectiveness. We examined the relationship between four PDMP features (provider-accessible system, proactive alert, interstate data sharing, and mandatory system use) and hospital service use for opioid-related diagnoses. **Methods:** Data were from Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2005–2013 State Emergency Department Databases (SEDD) and State Inpatient Databases (SID) from 23 States. Data for the PDMP features were obtained from the National Alliance for Model State Drug Laws. We used publicly available, State-level data in the regressions to capture covariates that could affect the outcomes. **Results:** Provider-accessible system and mandatory system use features were associated with a slower annual rate of growth of hospital utilization for opioid-related diagnoses. The proactive alert feature was associated with a lower rate of hospital utilization at the time of enactment, although it led to an increase in the annual rate of growth in these events. In December 2015, a manuscript on this study was submitted to *Health Affairs*.
Janice Blanchard, M.D., Ph.D., Susan O. Raetzman, M.S.P.H., Raynard Washington, Ph.D., M.P.H., Robert L. Houchens, Ph.D., Marguerite L. Barrett, M.S., Carol Stocks, Ph.D., R.N., and Rosanna M. Coffey, Ph.D.

Geographic Variation in Uninsurance and Changes in Hospital Inpatient Utilization Following the Affordable Care Act

Introduction: The goal of this study was to estimate the effects of the Affordable Care Act on hospital inpatient volumes and outcomes by examining temporal and cross-sectional variation in State characteristics and hospital use. This information helps identify factors underlying the large variation observed in Medicaid and uninsured use rates. **Methods:** Data were from Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) from 2011–2014 for 20 States (Arizona, California, Colorado, Hawaii, Iowa, Kentucky, Michigan, New Jersey, New York, Oregon, Vermont, Florida, Indiana, Kansas, Missouri, Montana, South Dakota, Tennessee, Virginia, and Wisconsin); State population estimates from the Census Bureau; unemployment rate estimates from the Bureau of Labor Statistics; Hospital market definitions (Health Service Area) from Dartmouth Atlas of Health Care; and ZIP Code Tabulation Area (ZCTA) population estimates by insurance status and federal poverty level (FPL) from the U.S. Census Bureau's American Community Survey. This was a retrospective cohort study, with hospitals as the sampling unit. Hospital fixed effects regression models were used to control for hospital heterogeneity. Geographic variation in hospital market uninsurance rates was used to estimate the effect of the Affordable Care Act Medicaid expansion and Health Insurance Marketplace subsidies on changes in uninsured hospital discharges. Other time-varying hospital market characteristics were statistically controlled. **Results:** There were significant associations between rates of uninsurance in hospital markets and reduction in use of hospital inpatient services by the uninsured—a finding that holds for both expansion and nonexpansion States. Overall between 2011 and 2013, the percentage of uninsured discharges increased from 11.3 percent to 12.1 percent and then fell to 8.3 percent. Between 2013 and 2014 in nonexpansion States, the percentage of uninsured discharges declined from 13.8 percent to 12.9 percent. In expansion States without pre-Affordable Care Act childless adult coverage, uninsured discharge percentages declined from 13.0 percent to 5.5 percent, whereas States with such coverage had declines from 7.1 percent to 4.8 percent.

Eli Cutler, Ph.D., Michael Dworsky, Ph.D., Christine Eibner, Ph.D., Sharat Iyer, M.D., Zeynal Karaca, Ph.D., Brian J. Moore, Ph.D., Gary Pickens, Ph.D., and Herbert S. Wong, Ph.D.

Health Effects of Climate Change

Introduction: The recent National Climate Assessment unambiguously states that climate change will increase adverse outcomes for a wide range of health effects. Some of these adverse outcomes already are being felt. Various regions of the country recently have experienced higher-than-average summer temperatures. Epidemiologic studies show that mortality during these extremely hot days is considerably higher than expected. Information about the potential effects on hospital admissions and emergency department (ED) visits during these extreme heat events is limited. The cumulative morbidity burden (considering all potential health outcomes in inpatient and ED settings) associated with extreme heat is expected to be significant. All heat-related mortality and morbidity outcomes are preventable; therefore, we need to link temperature and health outcome data to assess the health risk for specific communities. To design effective public health interventions for extreme heat, we need to determine the following: (1) the specific demographic groups (e.g., children, older adults, individuals with pre-existing medical conditions) that have high health risk during extreme heat and (2) the temperature at which adverse health effects increase. **Methods**: Daily, county-level hospital admission and ED data from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization (HCUP) State Inpatient Databases (SID) and State Emergency Department Databases (SEDD) will be linked with daily temperature data. We will estimate

time-series regression models for multiple health outcomes (e.g., cardiovascular, respiratory). The regression models will produce risk ratios for specific demographic groups (e.g., age groups). We also will derive the specific temperature beyond which we observe a rapid increase in adverse outcomes. This temperature value could inform issuance of heat warning systems by the local weather office and heat response plans for health agencies. The risk ratios and temperature thresholds will be at the county level or more aggregated geographic areas; no individual-level data will be presented as output.
Shubayu Saha, Ph.D. and Anne Elixhauser, Ph.D.

Impact of Multiple Chronic Conditions on the Cost of Hospital Stays

Introduction: The presence of multiple chronic conditions (MCCs) complicates inpatient hospital care, leading to higher costs and utilization. Multimorbidity also complicates primary care, increasing the likelihood of hospitalization for ambulatory care sensitive conditions. The purpose of this study was to evaluate how MCCs relate to inpatient hospitalization costs and utilization for ambulatory care sensitive conditions. **Methods:** The Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2012 State Inpatient Databases (SID) provided data to carry out a cross-sectional analysis of 1.43 million claims related to potentially preventable hospitalizations classified by the AHRQ Prevention Quality Indicator (PQI) composites. Categories of MCCs (0–1, 2–3, 4–5, and 6+) were examined in sets of acute, chronic, and overall PQIs. Multivariate models determined associations between categories of MCCs and (1) inpatient costs per stay, (2) inpatient costs per day, and (3) length of inpatient hospitalization. We used negative binomial regression with a logit link to model costs per stay and costs per day. **Results:** The most common category observed was 2 or 3 chronic conditions (37.8 percent of patients), followed by 4 or 5 chronic conditions (30.1 percent of patients) and by 6+ chronic conditions (10.1 percent). Compared with those for patients with 0 or 1 chronic condition, hospitalization costs per stay for overall ambulatory care sensitive conditions were 19 percent higher for those with 2 or 3 (95 percent confidence interval [CI] 1.19–1.20), 32 percent higher for those with 4 or 5 (95 percent CI 1.31–1.32), and 31 percent higher (95 percent CI 1.30–3.32) for those with 6+ conditions. Also compared with those with 0 or 1 chronic condition, acute condition stays were 11 percent longer when 2 or 3 chronic conditions were present (95 percent CI 1.11–1.12), 21 percent longer when 4 or 5 were present (95 percent CI 1.20–1.22), and 27 percent longer when 6+ were present (95 percent CI 1.26–1.28). Similar results were seen within chronic conditions. **Conclusion:** Associations between MCCs and total costs were driven by longer stays among those with more chronic conditions rather than by higher costs per day.
Ernest Moy, M.D, M.P.H. Kevin Heslin Ph.D., Hal Skinner, Ph.D., Jenna Jones, Ph.D., and Rosanna M. Coffey, Ph.D.

Impact of Penalties in the Hospital Readmission Reduction Program

Introduction: The purpose of this project is to assess the impact of publicly reported Centers for Medicare & Medicaid Services (CMS) hospital penalties (for having excessive readmissions) on future readmissions in the CMS Hospital Readmissions Reduction Program (HRRP).
Methods: We use a regression discontinuity model to measure the shift in the probability of a 30 day readmission around the random uncertainty of attaining a penalty for having a readmission ratio just above 1, compared to those hospitals just below 1 with no penalty. We look at readmissions during the 6 months after the public announcement of the penalty. The 2013 HCUP State Inpatient Databases (SID) for Arkansas, California, Georgia, Indiana, New York, and Wisconsin were used. For hospital characteristics, we also link the American Hospital Association (AHA) Annual Survey to the AHA Survey of Care Systems and Payment to obtain accountable care organization (ACO) variables (types of ACOs affiliated with the hospital).

The Health Research & Educational Trust and the Commonwealth Fund conducted a Care Coordination Survey in 2011 to assess the readiness of hospitals to develop ACOs. The findings of the 2011 Survey and other AHA surveys lead to the development of the AHA Survey of Care Systems and Payment in 2013. All U.S. community hospitals are invited to participate in the Survey. In addition, responses are gathered from non-hospital organizations, such as payers. We also link the AHA annual survey to SK&A data at the hospital level. IMS Health's SK&A Data Products provides the largest telephone-verified national dataset of 7 million profiles of health care providers and over 1 million profiles of health care organizations. The profiles include details about the provider or organization's affiliated ACOs, affiliated systems, affiliated health IT, etc. In addition, we link the AHA annual survey to CMS Hospital Compare, publicly reported quality measures in Medicare, and to CMS Readmissions Payment Data (the dollar value of the penalties imposed on hospitals by CMS under the Hospital Readmission Reduction Program).
William Encinosa, Ph.D.

Impact of Race/Ethnicity and Socioeconomic Status on Risk-Adjusted Hospital Readmission Rates Following Hip and Knee Arthroplasty

Introduction: Readmission rates for total hip arthroplasty (THA) and total knee arthroplasty (TKA) are increasingly used to measure hospital performance. Readmission rates that do not adjust for race/ethnicity and socioeconomic status (SES)—patient risk factors beyond a hospital's control—may not accurately reflect a hospital's performance. In this study, we examined the extent to which risk adjusting for race/ethnicity and SES affects hospital performance on readmission rates for THA and TKA. **Methods:** We used hospital discharge data from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2011 State Inpatient Databases (SID). Data were from 16 HCUP States that had unique synthetic patient linkage numbers to track patients across hospitals. We obtained information on hospital characteristics such as teaching status, bed size, location, and ownership status from the 2011 American Hospital Association (AHA) Annual Survey of Hospitals Database. We calculated two sets of risk-adjusted readmission rates: (1) using the Centers for Medicare & Medicaid Services (CMS) standard risk-adjustment algorithm that incorporates patient age, sex, comorbidities, and hospital effects and (2) adding race/ethnicity and SES to the model. Using the two different risk-adjusted hospital readmission rates (with and without race/ethnicity and SES), we compared hospitals by the statistical difference from the population mean (better than, worse than, or no different from the mean). We also compared hospitals' excess readmission ratio with and without race/ethnicity and SES included in the model. We calculated the excess readmission ratio, which is used to determine penalties in CMS's Hospital Readmissions Reduction Program, as the ratio of the risk-adjusted predicted number of readmissions to the expected number of readmissions based on logistic regression models. Results are forthcoming.
Grant Martsolf, M.P.H., Ph.D., R.N., Marguerite L. Barrett, M.S., Audrey Weiss, Ph.D., Ryan Kandrack, B.S., Raynard Washington, Ph.D., M.P.H., Claudia A. Steiner, M.D., M.P.H., Ateev Mehrotra, M.D., M.P.H., Nelson SooHoo, M.D., and Rosanna M. Coffey, Ph.D.

Impact of Race/Ethnicity and Socioeconomic Status on Risk-Adjusted Hospital Readmission Rates: Implications for the CMS Hospital Readmissions Reduction Program

Introduction: The Centers for Medicare & Medicaid Services (CMS) Hospital Readmissions Reduction Program (HRRP) penalizes hospitals with excess readmissions for select conditions and procedures. The HRRP methodology does not currently risk adjust readmission rates for race/ethnicity or socioeconomic status (SES), factors that are significantly related to readmissions. **Methods:** We used hospital discharge data from the Agency for Healthcare

Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2011 and 2012 State Inpatient Databases (SID). Data were from 15 HCUP States that had unique synthetic patient linkage numbers to track patients across hospitals. We obtained information on hospital characteristics such as teaching status, bed size, location, and ownership status from the 2011 American Hospital Association (AHA) Annual Survey of Hospitals Database and information on SES from the American Community Survey (ACS). We created an SES index using six ACS variables measured at the Zip Code Tabulation Area (ZCTA) in which patients reside: percentage of adults older than 25 years with less than a high school education, percentage of male unemployment, percentage of households with income below the poverty line, percentage of households receiving public assistance, percentage of female-headed households with children, and median household income. We compared two sets of excess readmission ratios for each HRRP measure: (1) the CMS standard risk-adjustment algorithm that incorporates patient age, sex, and comorbidities and (2) adding race/ethnicity and SES to the risk adjustment. We then estimated changes in penalties across various hospital characteristics. Results are forthcoming.

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Inpatient Admissions From the Emergency Department for Adults With Injuries: The Role of Clinical and Nonclinical Factors

Introduction: Inpatient hospital costs represent nearly one-third of heath care spending. The proportion of inpatient visits that originate in the emergency department (ED) has been growing, approaching half of all inpatient admissions. Injury is the most common reason for adult ED visits, representing nearly one-quarter of all ED visits. The objective of the study was to explore the association between clinical and nonclinical factors and the decision to admit ED patients with injury. **Methods:** This is a retrospective cohort study of injury-related ED encounters by adults in select States in 2009. We limited the study to ED visits of individuals with moderately severe injuries. We used logistic regression to calculate the marginal effects, estimating four equations to account for different risk patterns for older and younger adults and for types of injuries. Regression models controlled for comorbidities, injury characteristics, demographic characteristics, and State fixed effects. **Results:** Injury location, type, and mechanism as well as comorbidities had large effects on hospitalization rates, as expected. We found higher inpatient admission rates by level of trauma center designation and hospital size, but findings differed by age and type of injury. For younger adults, patients with private insurance and patients who traveled more than 30 miles were more likely to be admitted. **Conclusions:** There is great variation in inpatient admission decisions for moderately injured patients in the ED. Decisions appear to be dominated by clinical factors such as injury characteristics and comorbidities; however, nonclinical factors such as type of insurance, hospital size, and trauma center designation also play an important role.

William D. Spector, Ph.D., Rhona Limcangco, Ph.D., Ryan L. Mutter, Ph.D., Jesse M. Pines, M.D., M.B.A., M.S.C.E, and Pamela L. Owens Ph.D.

Length of Stay in Emergency Departments: Variation Across Classifications of Clinical Condition and Patient Discharge Disposition

Introduction: Duration of a stay in an emergency department (ED) is considered a measure of quality, but current measures average the length of stay across all conditions. Research on condition-specific length of stay has been limited to a single condition or a few hospitals. We use a census of one State's data to (1) measure length of ED stays by patients' conditions and dispositions and (2) explore differences between means and medians as quality metrics.

Methods: The data sources were the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2011 State Emergency Department Databases (SEDD) and State Inpatient Databases (SID) for Florida. Florida is unique in collecting ED length of stay for both released and admitted patients. We used HCUP Clinical Classifications Software (CCS) to group visits on the basis of first-listed *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) diagnoses. HCUP data were linked to the American Hospital Association (AHA) Annual Survey of Hospitals. **Results:** For the 10 most common diagnoses, patients with relatively minor injuries typically required the shortest mean stay (3 hours or less); conditions resulting in admission or transfer tended to be more serious, resulting in longer stays. Patients requiring the longest stays, by disposition, had discharge diagnoses of nonspecific chest pain (mean 7.4 hours among discharged patients), urinary tract infections (4.8 hours among admissions), and schizophrenia (9.6 hours among transfers) among the top 10 diagnoses. **Conclusion:** ED length of stay as a measure of ED quality should take into account the considerable variation by the patient's condition and disposition. ED length of stay measurement could be improved in the U.S. by standardizing its definition; distinguishing visits involving treatment, observation, and boarding; and incorporating more distributional information.
Ernest Moy, M.D., M.P.H., Rosanna M. Coffey, Ph.D., Brian J. Moore, Ph.D., Marguerite L. Barrett, M.S., and Kendall K. Hall, M.D., M.S.

Marginal Hospital Cost of Surgery-Related, Hospital-Acquired Pressure Ulcers

Introduction: The purpose of this study was to estimate the marginal hospital cost of a hospital-acquired pressure ulcer (HAPU) for patients covered by Medicare who undergo major surgery, adjusted for patient characteristics, comorbidities, and procedure risk factors. **Methods:** Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2011 and 2012 State Inpatient Databases and the Medicare Patient Safety Monitoring System (MPSMS). We obtained pressure ulcer information using retrospective structured record review from trained MPSMS data abstractors. Costs were derived using HCUP hospital-specific Cost-to-Charge Ratio Files (CCR Files). Marginal cost estimates were made using extended estimating equations. We estimated the marginal cost at the 25th, 50th, and 75th percentiles of the cost distribution using simultaneous quantile regression. **Results**: A total of 5.5 percent of patients undergoing major surgery developed HAPUs. The HAPUs added approximately $10,000 to the cost of a surgical stay after adjusting for comorbidities, patient characteristics, and procedures. This is an approximately 40 percent addition to the cost of a major surgical stay but less than half of the unadjusted cost difference. In addition, we found that for high cost stays (75th percentile) HAPUs added ~$13,000, whereas in low cost stays (25th percentile) HAPUs added ~$5,400. **Conclusions:** Our results suggest that the HAPUs add roughly 40 percent to the cost of major surgical hospital stays, but the amount varies depending on the total cost of the visit.
William D. Spector, Ph.D., Rhona Limcangco, Ph.D., Pamela L. Owens, Ph.D., and Claudia A. Steiner, M.D.

Medicare Advantage Versus Traditional Medicare: Effect on Hospital Admission Rates

Introduction: The Medicare Advantage (MA) program has expanded dramatically since 2000, now covering approximately 30 percent of all Medicare beneficiaries. Given the growth in the program, it is important to understand how the care provided by MA compares with traditional Medicare (TM). One important reflection of care provided is prevention of hospital admissions. If MA may is better than TM at curtailing admissions, which may indicate that it has more tools at its disposal to offer a continuum of care, then the government may want to further expand the MA program. If MA has similar or higher admission rates than TM, which may indicate stinting

on care, then the government may want to enact policies that require MA plans to improve the quality of care provided. The purpose of this study was to compare hospital use for individuals covered by MA and TM. **Methods:** Data were from the American Hospital Association (AHA) Annual Survey of Hospitals and the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) in 2013. We measured resource use using cost per discharge, length of stay per discharge, and readmissions. Results are forthcoming.
Herbert S. Wong, Ph.D., Zeynal Karaca, Ph.D., Rachel Henke, Ph.D., Eli Cutler, Ph.D., Jayne Johann, M.B.A., R.N., Katie Levit, B.A., Nils Nordstand, B.A., Minya Sheng, M.S., Marguerite L. Barrett, M.S., and Lauren Nicholas, Ph.D.

Pathways Through Hospital-Based Acute Care: Shifts From Inpatient to Outpatient Settings Are Occurring Regardless of Payer

Introduction: This study investigated trends from 2009 through 2013 in acute-care visits across emergency department (ED), observation, and inpatient settings in four States for major payer populations and the uninsured. **Methods:** Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project State Inpatient Databases (SID), State Emergency Department Databases (SEDD), and State Ambulatory Surgery and Service Databases (SASD) from 2009 through 2013 for four States (Georgia, Nebraska, South Carolina, and Tennessee). We focused on visits for 10 ambulatory care sensitive conditions (ACSCs) that commonly occur in acute-care settings and are potentially avoidable with access to high-quality ambulatory care. **Results:** From 2009 through 2013, hospital-based visits for ACSCs shifted. More patients were discharged from EDs or placed under observation, irrespective of payer. Following observation, inpatient admissions and discharges increased differently across payers. The effects of these shifts on quality of care and patient outcomes are unknown.
Teryl Nuckols, M.D., M.S.H.S., Katie Fingar, Ph.D., Marguerite L. Barrett, M.S., Carol Stocks, Ph.D., R.N., Pamela L. Owens, Ph.D., and Claudia A. Steiner, M.D., M.P.H.

Racial/Ethnic Disparities in In-Hospital Surgical Complications and Mortality Outcomes

Introduction: The aim of this study was to examine the role of patient, hospital, and community factors on racial and ethnic disparities in in-hospital, postsurgical complications. **Methods:** Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2011 State Inpatient Databases (SID), the American Hospital Association (AHA) Annual Survey of Hospitals, Area Health Resources Files (AHRF), and the Centers for Medicare & Medicaid Services Hospital Compare database. We conducted nonlinear hierarchical modeling to examine the odds of patients experiencing any in-hospital postsurgical complication. We assessed 5,474,067 inpatient surgical discharges with logistic regression. **Results**: Clinical risk, payer coverage, and community-level characteristics (especially income) completely attenuated the effect of race on the odds of post-surgical complications. Patients without private insurance were 30 to 50 percent more likely to have a complication; patients from low-income communities were nearly 12 percent more likely to experience a complication. Private, not-for-profit hospitals in small metropolitan or micropolitan areas and higher nurse-to-patient ratios led to fewer post-surgical complications.
Conclusions: Race does not appear to be an important determinant of in-hospital, post-surgical complications, but insurance and community characteristics have an effect. A population-based approach that includes improving the socioeconomic context may help reduce disparities in these outcomes.
Whitney Witt, Ph.D., M.P.H., Roxanne Andrews, Ph.D., Raynard Washington, Ph.D., M.P.H., Anika L. Hines, Ph.D., M.P.H., Lorena Lopez-Gonzalez, Ph.D., and Rosanna M. Coffey, Ph.D.

Racial/Ethnic Disparities in Readmissions in U.S. Hospitals: The Role of Insurance Coverage

Introduction: A better understanding of the key drivers of population-level differences in readmissions, particularly by race/ethnicity, can inform the development of interventions at the practice and policy levels to reduce overall inappropriate readmissions. One of the major factors that could contribute to readmission risks by racial/ethnic groups is the insurance status of patients. In this study, we examined (1) differences in rates of 30-day readmissions across patients by race/ethnicity and socioeconomic status (SES), and (2) the extent to which these differences were mediated by insurance coverage. **Methods:** We used Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2009 State Inpatient Databases (SID). Hospital discharge data of patients aged 18 years and older were from five U.S. States: California, Florida, Missouri, New York, and Tennessee. The data were linked to contextual and provider data from the Health Resources and Services Administration (HRSA) by primary care service area and to hospital characteristics data from the American Hospital Association Annual Survey. Results are forthcoming.
Jayasree Basu, Ph.D. and Amresh Hanchate, Ph.D.

Trends in the Markets of Safety-Net and Nonsafety-Net Hospitals

Introduction: The Affordable Care Act instituted broad changes that may influence the demand for services provided at safety-net hospitals (SNHs). It included an extensive coverage expansion encouraging previously uninsured individuals to enroll in expanded State Medicaid programs or private plans offered via new insurance exchange marketplaces. Changes in patient demand for SNH services and competition for newly insured patients could affect SNH financing and their ability to care for poor and underserved populations. The purpose of this study was to examine the early impact of the Affordable Care Act's Medicaid expansion on inpatient volume and market shares SNHs. **Methods:** We used Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) from 2013–2014 to identify SNHs and local non-SNH competitors in nine Medicaid expansion States. These States were selected because at the time of the study they had at least one quarter of data available from 2014. To describe hospital markets, we merged the SID with data on hospital characteristics from the American Hospital Association (AHA) Annual Survey and ZIP Code–level data from Nielsen Claritas. Using fixed effects models, we compared changes in inpatient discharge volume and market shares for adults aged 19–64 years in SNHs and non-SNHs. This study included 556 hospitals with 25 or more beds located in nonrural areas: 189 SNHs and 367 of their local (within 15 miles) non-SNH competitors. Results are forthcoming.
Vivian Y. Wu, Ph.D., M.S., Katie Fingar, Ph.D., M.P.H., H. Joanna Jiang, Ph.D., Raynard Washington, Ph.D., M.P.H., Andrew Mulcahy, Ph.D., M.P.P., and Gary Pickens, Ph.D.

Validating Cost Estimates Based on Cost-to-Charge Ratio Files in Healthcare Cost and Utilization Project Data

Introduction: The purpose of this study was to explore the consistency, accuracy, validity, and reliability of the current Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) Cost-to-Charge Ratio Files (CCR Files). **Methods:** Data were from HCUP State Inpatient Databases (SID) from 2013 for all States; State Emergency Department Databases (SEDD) from 2013 for 11 States (Hawaii, Iowa, Kentucky, Minnesota, Nebraska, New Jersey, North Dakota, South Dakota, Tennessee, Wisconsin, and Vermont); Centers for Medicare & Medicaid Services (CMS) Hospital Cost Report Information System

(HCRIS) forms 2552-10 and 2552-96 from 2004–2013; and CMS National Physician Fee Schedule Relative Value File Calendar Year 2013. This analysis included a detailed evaluation of the current process for creating the HCUP CCR files, including an overview of hospital charge and cost data generation and CCR processing steps. We tested the consistency of HCRIS reports over time, with special emphasis on the major change in CMS forms in 2010. We explored the number of HCUP hospitals requiring imputation of a CCR and the specific reasons imputation was required. We explored cost estimation alternatives and how they are used in practice. We also tested the reliability of CCRs with a comparison of the cost estimates created by HCUP CCRs with estimates derived from relative value units (RVUs). We investigated the extent to which these costing methods agreed with each other using a large sample of line item records from hospitals that contributed to the HCUP SEDD in 2013. Results are forthcoming.
Gary Pickens, Ph.D., Eli Cutler, Ph.D., Thomas J. Flottemesch, Ph.D., Brian J. Moore, Ph.D., and Natalia Coenen, M.P.H.

Studies Using Nationwide Databases

Comparison of Pediatric Discharge Estimates From the Healthcare Cost and Utilization Project (HCUP) Kids' Inpatient Database (KID) and National Inpatient Sample (NIS)

Introduction: The transition of the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) National (formerly Nationwide) Inpatient Sample (NIS) from a sample consisting of all discharges from a sample of hospitals to a sample of discharges across all hospitals calls into question the need for the Kids' Inpatient Database (KID) sample. The KID originally began in the 2006 data year because estimates for some less common conditions and procedures varied considerably from year to year, primarily because of the sampling strategy for the NIS. Because all discharges from a sample of hospitals were selected, the NIS was sensitive to which specific hospitals were selected in any given year. The NIS sample design now is similar to the KID sample design, which is a sample of pediatric discharges from all HCUP hospitals. The objective of this study was to evaluate whether the new NIS produced acceptable estimates for pediatric discharges so that the KID could be discontinued. **Methods:** Data were from the 2013 NIS and a specially-constructed version of the 2013 KID. Results are forthcoming.
Robert L. Houchens, Ph.D., David Ross, Anne Elixhauser, Ph.D., and Joanna Jiang, Ph.D.

Effect of Outdoor Pollution on Health Care Utilization for Common Childhood Pulmonary Conditions

Introduction: Asthma, bronchiolitis, and pneumonia are three of the most common conditions requiring hospitalizations and emergency department (ED) visits in childhood. These conditions have multifactorial risk factors (e.g., immune status, race, tobacco smoke exposure, maternal age, socioeconomic status, health insurance, and medical care), many of which are not amenable to modification or avoidance. However, environmental factors such as outdoor air pollutants are amenable to change and are plausible contributing factors to all three conditions. If outdoor air pollutants continue to be identified and quantified as contributors to the severity of childhood asthma, bronchiolitis, and pneumonia, then clinical and public health efforts to avoid or reduce exposures to these pollutants could result in positive and lifelong benefits for future cohorts of children in the United States. The aims of this investigation are to (1) determine whether air pollution exposures are associated with increases in health care utilization for childhood bronchiolitis, asthma, and pneumonia; (2) examine whether pollution from specific environmental source classes produce greater increases in health care utilization than pollution from other sources; (3) aggregate preventable pediatric and perinatal health care utilization for conditions that are attributable to outdoor air pollutants; and (4) explore whether results

obtained from a national sample using ZIP Code-based exposure assignment differ from those obtained in two geographically diverse States using residential address to assign ZIP Code. **Methods:** Data will be from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS) from 2008–2014. We will link these data to nationwide air pollutant data for the same time period from the U.S. Environmental Protection Agency (USEPA) Aerometric Information Retrieval System (AIRS), the largest database documenting criteria air pollutant concentrations across the country. To estimate exposures for areas without nearby monitoring data, especially rural areas, we will use state-of-the-art exposure assessment methods, including ambient air monitoring network data, satellite data, and land use regression methods.
Leonardo Trasande, M.D., Alexander Glick, M.D., and Anne Elixhauser, Ph.D.

Emergency Department Visits by Children and Young Adults With Diabetes, 2012

Introduction: Diabetes is one of the most common chronic diseases among children and young adults (YAs), affecting an estimated 208,000 individuals younger than 20 years. The emergency department (ED) represents a point of health care access for children and YAs, particularly those with acute symptoms related to diabetes. The objective of this study was to examine this population's diabetes-related ED visits. **Methods:** Data were from Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) National Emergency Department Sample (NEDS) 2012 discharge records of ED cases among individuals aged 0–29 years with any listed diagnosis of diabetes. We estimated variations by demographic characteristics (age, sex), region, payer, admission status, and diagnosis. **Results:** All noted differences were statistically significant at $p \leq 0.05$. In 2012, there were 587,300 diabetes-related ED visits for children and YAs in this age group. Most patients (76.5 percent) were treated and released, and the remaining 23.5 percent were admitted to the hospital. Diabetes-related ED visit rates were higher among YAs aged 18–29 years (905 per 100,000 U.S. population) compared with children aged 0–17 years (149 per 100,000). Female children and YAs had the majority (62.6 percent) of these visits. Diabetes-related ED visits were approximately three times higher among patients from the lowest income communities (278 per 100,000) compared with the highest income communities (94 per 100,000). Medicaid was the primary expected payer for nearly 40 percent of the visits. One out of five diabetes-related ED visits by children and YAs was diagnosed as uncontrolled diabetes, and over three-quarters of these visits resulted in hospital admission. Ketoacidosis was the most common complication among children and YAs with uncontrolled diabetes, and it accounted for approximately one out of seven diabetes-related ED visits in this age group. **Conclusions:** Children and YAs with diabetes frequently access the ED. Our data show differences in visit rates by demographic characteristics. Most children and YAs are treated in the ED and released, which suggests clear opportunities to improve screening, prevention, and care coordination.
Aitalohi Amaize, M.P.H., B.S.N., R.N., C.E.N. and Kamila B. Mistry, Ph.D., M.P.H.

Population-Based Trends in Pediatric Cardiac Surgery and Interventional Cardiology Procedures in the United States

Introduction: The growing numbers of pediatric patients with heart disease and adult survivors of congenital heart disease highlight the need to track trends in volumes and outcomes of pediatric cardiac interventions. **Methods:** This is a retrospective cross-sectional/cohort study. Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) Kid's Inpatient Database (KID) from 1997–2012. We generated nationwide estimates for children aged 0–17 years with *International Classification of Diseases,*

Ninth Revision, Clinical Modification (ICD-9-CM) principal procedure codes for surgical or interventional cardiology procedures of the heart or great vessels. **Results:** Inpatient cardiac procedure volumes declined from 30,721 cases (43/100,000 children aged 0–17 years) in 1997 to 27,397 (37/100,000) in 2012. Unadjusted mortality fell from 4.6 to 2.3 percent. Mean length of stay (MLOS) rose from 12.8 to 22.4 days. Aggregate hospital charges (in 2014 US$) rose from $3.5 to $8.6 billion. Corresponding costs rose from $1.4 to $2.5 billion. In 1997, cases with private insurance (57 percent) generated 53 percent of costs, and cases with Medicaid (33 percent) generated 38 percent of costs. In 2012, cases with private insurance (45 percent) generated 40 percent of costs, and cases with Medicaid (47 percent) generated 51 percent of the costs. Uninsured patients fell from 3.1 percent of cases in 1997 to 1.9 percent in 2012. Mirroring data from prior years, the 2012 KID identified 14,873 cases (377/100,000) in infants younger than 1 year. Mortality, MLOS, and mean costs/case were 3.4 percent, 34.3 days, and $128,266, respectively. For individuals aged 1–17 years, mortality was 0.8 percent in 12,521 cases (18/100,000). MLOS was 8.2 days, and mean costs/case were $51,155. **Conclusions:** Procedure volumes and population-based rates for 1997–2012 fell by ~10 percent; unadjusted mortality fell by 50 percent. As markers of resource use, MLOS and inflation-adjusted costs and charges roughly doubled. Medicaid's involvement increased. Relatively few treated patients were uninsured. Compared with individuals aged 1–17 years, infants had notably higher procedure rates, mortality, and resource use. Our findings merit further study using encounter-level data.

Darryl Gray, M.D., Sc.D., Kamal Pourmoghadam, M.D., Alan Hsu, M.P.H., Vivian Dicks, Ph.D., Jasmin Patel, M.P.H., Tri Le, M.P.H., Chinagozi Ugwu, M.P.H., Jeffrey Jacobs, M.D., Claudia A. Steiner, M.D., M.P.H., and Marshall Jacobs, M.D.

The Role of Medical Complications and Comorbidities in the Cost of Inpatient Stays for Alcoholic Liver Disease in the United States

Introduction: Alcoholic liver disease (ALD) often involves costly complications and comorbidities that require hospitalization. The main objective of this study was to estimate the contributions of clinical complications and comorbidities to the cost of inpatient care for ALD. **Methods:** Data were from the Agency for Healthcare Research and Quality (AHRQ) Hospital Cost and Utilization Project (HCUP) National Inpatient Sample (NIS) from 2012. We compared inpatient costs for adult patients with ALD with those for patients with other types of alcohol-related diagnoses. We estimated the marginal cost of stays involving ALD. We then examined the difference in costs between the ALD stays and non-ALD stays, categorized into those that could be attributed to ascites, upper gastrointestinal bleeding, and other complications and comorbidities. **Results:** In 2012, ALD was present in 20 percent of hospital stays that involved at least one alcohol-related diagnosis. The average cost for stays for ALD was $3,200 higher than stays for other alcohol-related diagnoses ($13,543 vs. $10,355; p<.001). The clinical complications and comorbidities included in the model accounted for approximately 45 percent of the higher average cost of all stays involving ALD. The comorbidity with the highest marginal cost was protein-calorie malnutrition ($6,650; p<.001), which accounted for approximately 12 percent of the higher average costs of ALD stays. **Conclusions:** The results suggest that policies focused on clinical practice and payment incentives that identify patients at increased risk of liver damage and encourage early intervention to prevent disease progression may be an effective way to target ALD inpatient costs.

Kevin Heslin, Ph.D., Anne Elixhauser, Ph.D., and Claudia A. Steiner, M.D., M.P.H.

Using the HCUP National Inpatient Sample (NIS) to Estimate Trends

Several revisions have been made to the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) National Inpatient Sample (NIS) sample design

since its inception that affect estimates calculated from the NIS. First, the sampling frame changed over time as more States made their data available to HCUP. The 1988 NIS was drawn from a frame of eight States representing 31 percent of the U.S. population. In contrast, later years of the NIS were drawn from a frame of States representing up to 95 percent of the U.S. population. Second, in 1998 the sampling method changed to better reflect the cross-sectional population of hospitals. The hospital stratification variables were redefined, rehabilitation facilities were dropped from the target universe, and sampling preference was no longer given to prior year NIS hospitals. In 2012, the sampling method changed again. Long-term acute care (LTAC) facilities were dropped from the target universe, hospitals were stratified by census divisions rather than census regions, hospital entities were defined by the State Inpatient Databases (SID) hospital identifiers, and discharge weights were calculated on the basis of SID discharge counts rather than counts reported by the annual American Hospital Association (AHA) survey. Third, the definitions and availability of NIS database variables changed over time. For example, diagnosis and procedure codes and diagnosis-related groups (DRGs) changed annually. Analysts who want to use the NIS to estimate trends in patient and hospital outcomes may need to adjust for these changes. This report describes these changes, provides information on the impact of these changes on estimates of numbers of discharges and other key variables, and contains recommendations for coping with these and other issues when doing trend analyses.
Robert L. Houchens, Ph.D., David Ross, and Anne Elixhauser, Ph.D.

Studies Using Both Nationwide and State Databases

Emergency Department Visits for Severe Pediatric Injuries: Effect of Hospital Trauma Level on Rate of Admissions

Introduction: The purpose of this study was to address two broad research questions related to pediatric injuries: (1) What are the demographic, clinical, and insurance characteristics of ED visits for severe pediatric injuries in the United States? (2) How does a hospital's trauma level impact their overall rate of admissions through the ED, transfer patterns, mortality rate, and/or follow-up care? **Methods:** We used the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) Nationwide Emergency Department Sample (NEDS), National (Nationwide) Inpatient Sample (NIS), State Inpatient Databases (SID), and State Emergency Department Databases (SEDD) from 2005–2013. The events of interest included pediatric ED visits and inpatient stays for severe injury, such as traumatic brain injuries, spinal injuries, and fractures for children aged 15 years and younger (excluding newborns). This work was funded via an interagency agreement with the Health Services Research and Administration (HRSA) Bureau's Emergency Medical Services for Children (EMSC) Program. Results are forthcoming.
Pamela L. Owens, Ph.D. and Marguerite L. Barrett, M.S

National Healthcare Quality and Disparities Reports (QDR) Special Analyses

In support of the National Healthcare Quality and Disparities Report (QDR), various Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization (HCUP) databases are being used for special analyses that are directed by AHRQ. In 2015, we published one manuscript titled "Length of stay in emergency departments: variation across classifications of clinical condition and patient discharge disposition" in the *American Journal of Emergency Medicine*. The analysis used 2010 State Emergency Department Databases (SEDD) data from Florida. We continue to wait for review of the manuscript titled "Managed care and inpatient mortality in adults: effect of primary payer" from the *American Journal of Managed Care* (submitted in 2014). The study used 2009 State Inpatient Databases (SID) data for 11 States.

Five manuscripts will be submitted to peer-reviewed journals. The manuscripts are:

- "Chest symptoms: admissions after discharge from an emergency department" used 2012 and 2013 SID and SEDD data from eight States to examine patient characteristics associated with inpatient admissions for related symptoms after discharge from an ED for chest symptoms.
- "Age-related disparities in access to trauma centers for patients with severe head injuries following the release of the updated field triage guidelines" used 2009 and 2012 SID and SEDD data from 31 States. The authors examined whether older adults with a traumatic head injury were less likely to receive initial treatment at a trauma center before and after introduction of the revised field triage guidelines.
- "Sepsis-related hospitalizations and deaths: ten-year trends by race and ethnicity" used 2004–2013 SID data to describe trends in sepsis-related hospitalizations and in-hospital mortality rates by race/ethnicity.
- "The effects of multiple chronic conditions on hospitalization costs and utilization for ambulatory care sensitive conditions in the United States: a nationally representative cross-sectional study" used 2013 SID data from 38 States to evaluate how multiple chronic conditions relate to inpatient hospitalization costs and utilization for ambulatory care sensitive conditions.
- "The association of patients' primary language with readmission for high-volume hospital conditions" used 2009–2013 SID data from California to examine the association between patients' primary language and readmission for high-volume hospital conditions while controlling for clinical factors, patient characteristics (e.g., sex, race, community income), and hospital characteristics (e.g., bed size, location).

Ernest Moy, M.D., M.P.H., Kevin Heslin, Ph.D., Rosanna M. Coffey, Ph.D., Marguerite L. Barrett, M.S., Katie Fingar, Ph.D., Susan O. Raetzman, M.S.P.H., Thomas J. Flottemesch, Ph.D., Jenna Jones, Ph.D., Brian J. Moore, Ph.D., and Anika L. Hines, Ph.D., M.P.H.

Ongoing Studies

National Healthcare Quality and Disparities Reports (QDR)

Since 2003, the Agency for Healthcare Research and Quality (AHRQ) has produced congressionally mandated reports each year on health care quality and disparities for vulnerable populations in the United States. The *National Healthcare Quality and Disparities Report (QDR)* includes information from the AHRQ Healthcare Cost and Utilization Project (HCUP) and from numerous other organizations, including the Centers for Disease Control and Prevention (CDC), the Centers for Medicare & Medicaid Services (CMS), and the National Center for Health Statistics (NCHS).

Beginning with the 2014 report, findings that previously appeared in two separate reports (the *National Healthcare Quality Report* and the *National Healthcare Disparities Report*) have been integrated into a single document that provides a comprehensive overview of the quality of health care received by the general population and disparities in care experienced by different racial, ethnic, and socioeconomic groups. Information on individual measures will be available through chartbooks, which will be posted monthly.

The QDR measures and tracks trends in quality and disparities in seven key areas of health care: access to health care, patient safety, person-centered care, care coordination, effective treatment, healthy living, and care affordability. A focus on priority populations summarizes quality and disparities in care for populations at elevated risk for receiving poor health care. This section includes HCUP-based measures related to racial, ethnic, and socioeconomic

factors for priority populations as well as changes over time and across the urban-rural continuum.

The 2015 QDR (to be released in early 2016) will include national estimates of the AHRQ Quality Indicators, version 4.4, for data years 2000–2013 and State-level estimates for data years 2004 and 2011–2013. For the national estimates in 2013, HCUP created a nationally weighted analysis file from the 2013 State Inpatient Databases (SID) from 34 States that contribute to HCUP. Prior to 2012, this file had a sampling design (sample of hospitals) that was similar to the Nationwide Inpatient Sample (NIS) and was used to report national estimates by various patient characteristics (e.g., age, sex, race/ethnicity, community income, expected payer, urban-rural location of the patient residence) and hospital characteristics (e.g., region, ownership, teaching status, urban-rural location). Individual SID were used for reporting State-level estimates of the AHRQ Quality Indicators (QIs) overall and by race/ethnicity, expected payer, and community income. State-level rates are reported only for HCUP Partners that have volunteered previously to participate in the report and for new participants.

AHRQ disseminates the QDR information through the AHRQ Web site at http://www.ahrq.gov/research/findings/nhqrdr/index.html. There also is an integrated Web site at http://nhqrnet.ahrq.gov that provides a single access point to the QDR data, including State-specific information (i.e., the State Snapshots and a query tool for accessing the underlying data). The integrated QDR Web site allows the user to accomplish the following:

- Navigate national and State-level information by subject areas and topics
- Compare national and State-level performance against achievable benchmarks
- View national trends
- Consider comparisons overall and by race/ethnicity and community income
- Drill down to detailed data, tables, and graphs.

Rosanna M. Coffey, M.A., Ph.D., Marguerite L. Barrett, M.S., and Ernest Moy M.D., M.P.H.

NEW STUDIES PLANNED FOR 2016

Studies Using State Databases

- As Hospitals Strive to Reduce Readmissions, Are Patients Shifted Into Observation Care? (SID, SASD, SEDD)
- Changes in Utilization, Market Share, and Performance of Safety-Net and Nonsafety-Net Hospitals in Major Metropolitan Areas Following Implementation of the Affordable Care Act (SID, SEDD)
- Characterizing Inpatient and Emergency Department Hospital Visits After Index Hospitalization for an Opioid-Related Diagnosis (SID, SEDD)
- Effect of Increases in Medicare Advantage Enrollment on Medicare Utilization (SID)
- Use of Hospital Services Before and After Implementation of the Affordable Care Act (SID, SEDD)

Descriptions for these studies are provided below. The databases used in these studies are shown in parentheses above.

Studies Using State Databases

As Hospitals Strive to Reduce Readmissions, Are Patients Shifted Into Outpatient Care?

Introduction: In 2012, the Centers for Medicare & Medicaid Services (CMS) initiated the Medicare Hospital Readmissions Reduction Program (HRRP), which penalizes hospitals for having high rates of potentially avoidable readmissions. In recent years, there has been a reduction in readmission rates, particularly within the Medicare program. Many people have credited this reduction to the success of the Medicare HRRP. However, there has been an increase in the use of observation stays and treat-and-release ED visits, which could be driving at least part of the reduction in readmission rates. Thus recent reductions may be driven by changes in patterns of care rather than by improved quality of care. If a patient who was previously hospitalized for an HRRP-defined condition returns within 30-days and is discharged home after being treated in observation services (OS) or the ED, this visit does not count as a readmission. As a result, hospitals and physicians may be under more pressure to treat patients on an outpatient basis. The goal of this study is to assess whether the Medicare HRRP has been associated with a reduction in readmission rates through increased utilization of treat-and-release OS and ED visits. **Methods:** Data sources will be the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), State Emergency Department Databases (SEDD), and State Ambulatory Surgery and Services Databases (SASD) from 2009–2014 for four States (Georgia, Nebraska, South Carolina, and Tennessee) that have good capture of OS and patient linkage numbers. We will examine all-cause readmissions following inpatient (IP) index events within 30 days before (2009–2010) and after (2013–2014) the HRRP was implemented. We will focus on three clinical conditions targeted by the HRRP as of 2012: acute myocardial infarction, heart failure, and pneumonia. Analyses will include the frequency of and reasons for IP readmissions following index admission, OS revisits that do not result in IP admission, and treat-and-release ED revisits. We will compare readmission rates including OS and ED revisits in the numerator with readmission rates calculated using IP readmissions only.
Katie Fingar, Ph.D., M.P.H., Marguerite L. Barrett, M.S., Teryl Nuckols, M.D., M.S., Grant Martsolf, Ph.D., M.P.H., R.N., Carol Stocks, Ph.D., R.N., Pamela L. Owens, Ph.D., and Claudia A. Steiner, M.D., M.P.H.

Changes in Utilization, Market Share, and Performance of Safety-Net and Nonsafety-Net Hospitals in Major Metropolitan Areas Following Implementation of the Affordable Care Act

Introduction: The Affordable Care Act instituted broad changes that may influence the demand for services provided at safety-net hospitals (SNHs). It included an extensive coverage expansion that encouraged previously uninsured individuals to enroll in expanded State Medicaid programs or private plans offered via new insurance exchange marketplaces. Changes in patient demand for SNH services and competition for newly insured patients could affect SNHs in their financial performance and their ability to care for poor and underserved populations. The purpose of this study is to examine the early impact of the Affordable Care Act's Medicaid expansion on SNH inpatient and emergency department (ED) volume, market share, and financial performance. **Methods:** We will use Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) and State Emergency Department Databases (SEDD) from 2013–2015 to identify SNHs and non-SNHs. The 2013–2014 SID are available for 26 Medicaid expansion States and 17 non-expansion States, and the SEDD are available for 13 expansion and 11 non-expansion States. A subset of these States also will have quarterly SID from 2015. We will

compare changes in inpatient discharge volume, ED volume, and market share by payer for adults aged 19–64 years in SNHs and non-SNHs in Medicaid and non-Medicaid expansion States. Using data from Centers for Medicare & Medicaid Services (CMS) Cost Reports, we also will examine indicators of financial performance (e.g., uncompensated care, total and operating margins).
Katie Fingar, Ph.D., M.P.H., H. Joanna Jiang, Ph.D., Gary Pickens, Ph.D., Ioana Popescu, M.D., M.P.H., and José J. Escarce, M.D., Ph.D.

Characterizing Inpatient and Emergency Department Hospital Visits After Index Hospitalization for an Opioid-Related Diagnosis

Introduction: In the past decade, there has been a significant increase in hospitalizations and emergency department (ED) visits for opioid-related diagnoses. Most acute care hospital visits, including those related to short-term detoxification, are associated with limited or no inpatient treatment. In addition, connection to outpatient therapy rarely occurs after discharge, despite evidence that linkage with such therapy may reduce opioid abuse in the long term. Inpatient visits for opioid-related diagnoses may represent missed opportunities for the health care system to link patients to more comprehensive treatment. The goals of this study are to (1) characterize hospital inpatient and ED visits that occur after acute inpatient hospitalizations for opioid-related diagnoses, and (2) evaluate whether associated inpatient detoxification and/or rehabilitation treatment alters the length of time before repeat inpatient or ED visits, including those related to opioids.
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Effect of Increases in Medicare Advantage Enrollment on Medicare Utilization

Introduction: The Medicare Advantage (MA) program has expanded dramatically since 2000, now covering approximately 30 percent of all Medicare beneficiaries. Given the growth in the program, it is important to understand how the care provided by MA compares with traditional Medicare (TM) in terms of cost, health care utilization, and quality of care. For this study, we will examine the relationship between the rate of increase in MA enrollment and overall Medicare utilization (e.g., hospital admission and readmission rates, types of hospitalizations, and associated costs). **Methods:** We will use Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) data from at least 5 years from States that differentiate between TM and MA. We will estimate longitudinal models using change in MA enrollment (per capita or percent) as the key predictor of changes in overall Medicare utilization. We will use area-level (county or Core-Based Statistical Area [CBSA]) fixed effects to control for time-invariant area characteristics and to identify the relationship between MA enrollment and Medicare utilization (total, MA, and TM) changes over time. Outcomes will be various measures of Medicare utilization including Medicare admission rates, admission rates for ambulatory care and nonambulatory care sensitive conditions, readmissions, length of stay per discharge, and cost per discharge. For readmissions, we will use the subset of States that allow researchers to track admissions over time. All models will control for discharge-level and hospital-level characteristics as well as time-varying characteristics of markets. We will develop an area-based measure of health (e.g., CBSA) on the basis of responses to surveys on health status and health by TM and MA beneficiaries, on average. We will include this measure in models that will address potential endogeneity and selection in enrollment and utilization. Study results are forthcoming.
Herbert S. Wong, Ph.D., Zeynal Karaca, Ph.D., Teresa B. Gibson, Ph.D., Rachel Henke, Ph.D., Eli Cutler, Ph.D., and Chapin White, Ph.D.

Use of Hospital Services Before and After Implementation of the Affordable Care Act

Introduction: The purpose of this study is to examine effects of the Affordable Care Act Medicaid expansions on hospital utilization volumes and outcomes for all payers, Medicaid, and the uninsured. **Methods:** This study will extend the work started in 2015 using additional years of data from Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) and State Emergency Department Databases (SEDD). We will adopt a population-based approach, further characterizing markets where Medicaid expansions did and did not occur. We will examine the impact of the expansions on all payer types. We also will extend this work to examine whether enrollment in insurance under the Affordable Care Act's coverage expansions was driven by health status; that is, we will study whether there is evidence of selection of new coverage options provided under the legislation on the basis of the patient's health status. The Affordable Care Act does not change the out-of-pocket price of care for the uninsured; therefore, changes in utilization that are driven by insurance coverage expansions among the uninsured population provide direct information about their health status. We also will analyze data in sub-State geographic markets, which have differing take-ups of coverage under the Affordable Care Act. We will perform a modest extension of the work to date with the current inpatient dataset, adding sensitivity analysis and specification tests.

Zeynal Karaca, Ph.D., Herbert S. Wong, Ph.D., Gary Pickens, Ph.D., Teresa B. Gibson, Ph.D., Eli Cutler, Ph.D., Brian J. Moore, Ph.D., Michael Dworsky, Ph.D., Christine Eibner, Ph.D.

USING HCUP DATA IN CONJUNCTION WITH OTHER DATA SOURCES

To enhance the value of Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) data as a research tool, AHRQ supplements the HCUP databases with Partner-approved information about hospital and community characteristics obtained from external sources. AHRQ conducts this data augmentation for three reasons: (1) to supplement information available to AHRQ intramural researchers and their contractors on specific, approved research projects; (2) to create derivative data elements for the externally released State and Nationwide Databases; and (3) to add supplementary data elements for the externally released State and Nationwide Databases. These types of linkages leverage other data sources, thus increasing the value of HCUP data for research.

AHRQ releases three hospital-level HCUP Supplemental Files based on external data that are designed to augment the data elements in the National Inpatient Sample (NIS), Kids' Inpatient Database (KID), Nationwide Readmissions Database (NRD), and State Inpatient Databases (SID). The HCUP Cost-to-Charge Ratio Files (CCR Files) provide a conversion between the total charge information (representing the amount hospitals billed for services) and the cost for hospital services. CCR File measures, which are developed using Centers for Medicare & Medicaid Services (CMS) Hospital Cost Report data, are available at the hospital level.

The HCUP Hospital Market Structure Files (HMS Files) contain various measures of hospital market competition. These measures are available at the hospital level and are developed using data from the American Hospital Association (AHA) Annual Survey of Hospitals Database, Area Health Resource File (AHRF), linkage to urban/rural indicators, and ZIP-Code data based on longitude and latitude for calculations of distance and travel times. Data for a State's hospitals are included in the CCR and HMS Files at the discretion of the participating data organization. Beginning with 2012 data, the HMS Files are no longer linkable to the NIS and KID files. HMS Files are not available for the NRD.

The following descriptions provide a sample of the protocols used to link HCUP data to other data files.

American Hospital Association Annual Survey of Hospitals Database

Annual linkage of the AHA Annual Survey of Hospitals Database to HCUP data is necessary for the creation of the HCUP databases. HCUP uses the AHA data for three principal purposes: (1) to obtain characteristics of the hospitals for intramural research; (2) to add hospital characteristics to restricted-access, public release data; and (3) to sample and weight hospital discharges for the NIS, Nationwide Emergency Department Sample (NEDS), NRD, and KID.

1. HCUP develops a separate AHA file for intramural research that contains basic institutional characteristics such as size, ownership, teaching status, location, utilization, finance, and personnel. A "crosswalk" file is developed to link the State's hospital identifier to the AHA identifier, which also links the HCUP and AHA data sets. This linkage of supplemental hospital characteristics to HCUP databases greatly enriches the discharge data for intramural research at AHRQ.
2. HCUP adds hospital information from the AHA Annual Survey Database to the NIS, NEDS, NRD, and KID. Hospital identifiers never were included in the NEDS or NRD, but prior to 2012 data when permitted by the data organizations, the NIS and KID included the AHA hospital identifier, hospital name, and address. Beginning with 2012 data, hospital identifiers no longer are included in the NIS or KID. AHA hospital identifiers are included on the Central Distributor State Databases when permitted by the data organizations. Use of the data for approved research purposes is permitted, such as linking to other institutional information from non-HCUP data sets for analysis and aggregate statistical reporting. However, users of any HCUP data are prohibited from identifying individual facilities directly or by inference in disseminated material. This restriction is listed in all HCUP Data Use Agreements (DUAs). In addition, users of the data must not contact establishments directly concerning data in the HCUP databases.
3. HCUP creates the NIS, NEDS, and NRD sampling frames from all community, nonrehabilitation hospitals in the SID that can be matched to the corresponding hospitals in the AHA Annual Survey Database. Beginning with 2012 data, the NIS contains a sample of approximately 20 percent of inpatient discharges from all community, nonrehabilitation hospitals participating in HCUP. The NEDS contains all emergency department (ED) visits from a stratified sample representing 20 percent of hospital-based EDs in U.S. community, nonrehabilitation hospitals. To obtain nationwide estimates, HCUP develops discharge weights using information from the AHA Annual Survey of Hospitals Database.

American Hospital Association (AHA) Hospital Electronic Health Record Adoption Database

The Hospital Electronic Health Record (EHR) Adoption Database is a supplement to the American Hospital Association (AHA) Annual Survey of Hospitals Database. The EHR Database allows hospitals to see their progress along the technology adoption curve in terms of clinical documentation, lab reports and test results, computerized provider order entry, and decision support and bar coding. The database also pinpoints where in the hospital these functions are implemented. These data can be linked to the HCUP databases by the AHA hospital identifier. The results help users understand the capabilities of the hospitals' EHR

systems, and they reveal the major and minor barriers to implementation. The database includes only those hospitals that respond to the supplemental information technology survey.

American Hospital Association (AHA) Linkage to Hospital Information Technology Data

AHRQ links the HCUP data to health information technology (IT) data for studies that evaluate Meaningful Use (MU) Incentives under the Health Information Technology for Economic and Clinical Health (HITECH) Act. This linkage includes the AHA Annual Survey Information Technology hospital database, which is a supplement to the AHA Annual Survey of Hospitals. This database identifies the hospital's progress in adopting technology in terms of clinical documentation, lab reports and test results, computerized provider order entry, decision support, and bar coding. It also pinpoints where in the hospital these functions are implemented. The database also helps users understand the capabilities of the hospitals' EHR systems and reveals the major and minor barriers to implementation. It includes only those hospitals that respond to the supplemental Information Technology survey. These data can be linked to the HCUP databases by the AHA hospital identifier.

American Hospital Association (AHA) Survey of Care Systems and Payment

The American Hospital Association (AHA) Survey of Care Systems and Payment is a supplement to the American Hospital Association (AHA) Annual Survey of Hospitals Database. All U.S. community hospitals are invited to participate in the Survey. In addition, responses are gathered from non-hospital organizations, such as payers. This database allows hospitals and researchers to track and monitor the range of systems of care, including Accountable Care Organizations (ACO), Patient-Centered Medical Homes, clinically integrated networks, and other systems innovations. These data can be linked to the HCUP databases by the AHA hospital identifier. Databases enhanced with these data facilitates research on a variety of policy-relevant issues such as: identifying which types of hospitals are engaged in new care models; ascertaining current and expected payment structures; understanding current care coordination models; and recognizing risk arrangements, governance, and physician arrangements.

Centers for Medicare & Medicaid Services Hospital Cost Report Data Files

Using hospital identifiers, AHRQ links the cost information obtained from Hospital Cost Report data files, which are collected by CMS, to the intramural HCUP data to create the annual HCUP Cost-to-Charge Ratio Files (CCR Files). The HCUP CCR Files are hospital-level files that enable the conversion of charges into costs for nearly every hospital in the corresponding NIS, SID, NRD, or KID.

Centers for Medicare & Medicaid Services Hospital Compare

The Hospital Compare tool provides information about the quality of care for over 4,000 Medicare-certified hospitals in the United States. Using the tool, AHRQ examines the role of various hospital factors, such as nurse-to-patient ratio and surgical quality, on racial and ethnic disparities in inhospital postsurgical complications identified in HCUP data.

Centers for Medicare & Medicaid Services Hospital-Level and County-Level Data

For certain research projects, AHRQ links county-level and hospital-level information obtained from CMS to the HCUP data. County-level databases contain such information as the number of beneficiaries in the county, the number of beneficiaries by type of plan coverage, and the

area wage index. These data are linked to the discharge files using the patient's or hospital's county. Hospital-level files maintained by CMS include the Medicare Cost Reports, area wage index, and case-mix index. These data are linked using the hospital identifier. The State's hospital identifier is crosswalked to the identifier on the AHA Annual Survey of Hospitals Database, which contains the Medicare hospital identifier.

Centers for Medicare & Medicaid Services Medicare Hospital Service Area File

The Medicare Hospital Service Area File (HSAF) is used for the community-level statistics initiative to estimate the impact of missing hospitals on HCUP community-level statistics. The HSAF identifies counties with incomplete data. It provides the universe of Medicare discharges in the United States and contains the patient's residential ZIP Code, Medicare provider identification number (ID), and a sum of patient discharges, days, and charges for all Medicare patients. Capture rates computed from the HSAF and SID allowed HCUP to examine several thresholds for suppression of county information that is due to missing hospitals in the SID.

Children's Hospital Association (formerly National Association of Children's Hospitals and Related Institutions)

During the construction of the KID, the AHA hospital identifier is used to link this database to a list of children's hospitals provided to AHRQ by the Children's Hospital Association. The Children's Hospital Association data are used to help identify children's hospitals and to determine the teaching status of these facilities.

Environmental Files

AHRQ links county-level temperature data to HCUP county-level hospitalization and emergency department data using two external data sets: (1) weather station data maintained by the National Oceanic and Atmospheric Administration (NOAA) and (2) modeled data covering the entire county from the North American Land Data Assimilation System (NLDAS), which is obtained from the National Aeronautics and Space Administration (NASA).

The Aerometric Information Retrieval System (AIRS) is the largest database documenting air pollutant concentrations across the country. This database is maintained by the United States Environmental Protection Agency (EPA). For some research projects, AHRQ links nationwide air pollutant data from the AIRS to HCUP nationwide hospitalization data using admission data and patient ZIP code.

Healthcare Information and Management Systems Society (HIMSS) Analytics ® Database

The Health Information Management Systems Society (HIMSS) Analytics® Database provides information on health IT adoption. HIMSS Analytics, a subsidiary of the Healthcare Information and Management Systems Society, annually surveys a sample of U.S. nonfederal hospitals affiliated with integrated health care delivery systems (IHDSs). The HIMSS data include information about the extent of electronic medical records functionality, which is reflected in a score from 0 to 7.

HealthLeaders–Interstudy Managed Market Surveyor County Database

The HealthLeaders–Interstudy Managed Market Surveyor County Database contains State, county-level, and Metropolitan Statistical Area (MSA) enrollment in managed care plans,

including health maintenance organization (HMO) and preferred provider organization (PPO) penetration. For specific projects, AHRQ links Interstudy's database to HCUP data at the county level on the basis of the hospital's location.

Health Resources and Services Administration Area Health Resource File

Researchers may enhance the analytic capabilities of HCUP by using the Area Health Resource File (AHRF), a publically available database developed by the Health Resources and Services Administration (HRSA) Bureau of Health Professions. The AHRF contains county-level statistics on health care professions, hospitals and health care facilities, and population and environmental classifications. The AHRF county-level data can be linked to the HCUP databases to provide additional information such as demographic data on the hospital's county or patient's county of residence. The AHRF is not part of the HCUP databases; researchers are required to obtain the AHRF separately.

Health Resources and Services Administration Data Warehouse

The HRSA Data Warehouse (HDW) integrates data with various external sources, enabling researchers to collect relevant and meaningful information on health care programs and the associated populations they serve. For some research projects, AHRQ links primary care service area (PCSA) data from the HDW—which contains nationwide data on U.S. primary health care resources, populations, and utilizations—with patient PCSA-level data in the HCUP SID.

Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Survey

HCAHPS patient survey responses at U.S. hospitals are aggregated for each hospital and reported publicly by the Centers for Medicare and Medicaid Services (CMS) on their Hospital Compare Web site starting March 2008. AHRQ links these data with hospital-level characteristics to control for patients' perceptions of the quality of hospitals. In these studies, AHRQ typically "controls" for the percent of patients that replied in a certain way to a particular question or group of questions by entering hospital percentages as they vary across time and hospitals in a regression model.

Linkage to Urban/Rural Indicators

AHRQ also links files in the HCUP data that provide measures of the *urban character* or *rural character* of the patient's residence or hospital's location. This information includes the county-based Metropolitan Statistical Area (MSA), Core-Based Statistical Area (CBSA), Urban Influence Code, and Rural Urban Continuum Code. These codes are available through files maintained by the U.S. Census Bureau, the U.S. Department of Agriculture, and the Health Resources and Services Administration (HRSA). Linkages to these files are made using the patient's county or hospital's county. Another urban/rural measure has been developed through linkage to the ZIP Code-based Rural Urban Commuting Area (RUCA) codes available from the Washington, Wyoming, Alaska, Montana, Idaho (WWAMI) Rural Health Research Center. This linkage is made using the patient's ZIP Code of residence or the hospital's ZIP Code.

HCUP creates a version of the urban/rural codes through linkage to National Center for Health Statistics (NCHS) data available from the CDC. The NCHS provides county-level classifications of urban/rural location, which includes gradations of metropolitan, micropolitan, and noncore counties by population size. Population counts from the ZIP Code-level Claritas file are

assigned to a county and then aggregated to the NCHS urban/rural designation. Both patient and hospital locations are reported by NCHS designation.

Any patient ZIP Code linkage would conform to the same restrictions described below. The patient's ZIP Code can be accessed only with approval of the HCUP Project Officer.

Medicare Patient Safety Monitoring System

For certain research projects, AHRQ enhances the analytical capabilities of HCUP by linking to the Medicare Patient Safety Monitoring System (MPSMS). MPSMS is a national surveillance project aimed at identifying the rates of specific adverse events that occur in the hospital. MPSMS includes a subset of hospitals participating in the Medicare Hospital Payment Monitoring Program. The project conducts a chart abstraction of randomly selected, all-payer adult discharges. MPSMS is a de-identified, record-level database that includes information abstracted about the patient's stay in the hospital, including health care associated injury or harm. Linking to MPSMS will provide AHRQ and other federal agencies with a more robust understanding of the frequency and epidemiology of health care associated injury or harm for the inpatient population. MPSMS hospital level information can be linked to the HCUP data. The MPSMS hospital identifier must first be linked to the CMS Provider of Services (POS) file, which then can be crosswalked to the identifier on the AHA Annual Survey Databases and then linked to HCUP. Individual records can be linked using a probabilistic approach; linking does not identify patients because both HCUP data and the MPSMS are de-identified databases.

Merchant Medicine

Merchant Medicine is a research and consulting firm specializing in the field of walk-in medicine, tracks the location of all retail clinics in the United States on an ongoing basis in an effort to inform businesses specializing in walk-in medicine. The data, available starting in 2005, can also be purchased for research purposes. These data include the dates of opening and closing and geocoded addresses of all retail clinics in the United States. These data can be linked to HCUP databases at the ZIP Code level by calculating the percentage of ED catchment areas (ZIP Codes that accounted for three-quarters of all ED visits for low-acuity conditions in the pre-study period) that overlapped with the geographic area within a 10-minute drive from a retail clinic.

SDI Outpatient Surgery Centers Profiling Solution

For certain intramural research projects, AHRQ may link facility-level data from the SDI Freestanding Outpatient Surgery Center (FOSC) database from IMS Health to freestanding ambulatory surgery data in the HCUP SASD. The FOSC database (also called the Outpatient Surgery Centers Profiling Solution), created by IMS Health, contains facility-level data on free-standing ambulatory care centers in the United States. Data include operational characteristics (e.g., number of operating rooms, number of physicians), surgical characteristics (e.g., types and number of surgeries performed), purchasing patterns, facility name and address, and personnel information.

SK&A Data Products

IMS Health's SK&A Data Products provides the largest telephone-verified national dataset of 7 million profiles of health care providers and over 1 million profiles of health care organizations. The profiles include detail characteristics about individual providers and organizations, such as

affiliations with health systems and Accountable Care Organizations. This supplemental database allows for analyses to understand how organizational structures and market forces influence the delivery, costs, and quality of health care.

Small Area Health Insurance Estimates for Counties and States

A preliminary analysis for the National Healthcare Quality Report (NHQR) examined the use of data from the Census Bureau's Small Area Health Insurance Estimates (SAHIE) program to identify national quartiles of county-level lack of insurance (uninsurance). Estimates of health insurance coverage for States and all counties in the United States can be produced using the SAHIE data. County-level estimates on the number of people without health insurance coverage were created for people of all ages, including those younger than 19 years. The uninsurance quartiles designation were used with the NIS to examine differences in the AHRQ Quality Indicators (QIs) by insurance status.

State Board of Medical Examiners Physician Data

In order to understand physician practice styles for specific research, AHRQ links the HCUP SID to State-specific Board of Medical Examiners physician data in order to create files for analysis. AHRQ contacted and received permission from select State Partners to conduct this study.

Surescripts

Surescripts®, an e-prescribing network, links by geographical market, Hospital Referral Region (HRR). Surescripts is an e-prescription network used by the majority of all community pharmacies in the U.S. routing prescriptions, excluding closed systems such as Kaiser Permanente. This includes chain, franchise, and independently owned pharmacies. Surescripts network data exclude controlled substances.

Trauma Information Exchange Program

For certain intramural research projects, AHRQ may link hospital-level data from the Trauma Information Exchange Program (TIEP) to the HCUP SEDD and SID. Trauma-level data are also used as stratifiers for the NEDS. The TIEP data are maintained by the American Trauma Society and the Johns Hopkins Center for Injury Research and Policy, which receive funding from the CDC. The database maintains a national inventory of trauma centers in the United States and designates the trauma level (I, II, III, IV, or V).

ZIP Code-Based and County-Based Census Data

For database development and specific research, AHRQ links data from the U.S. Census to the HCUP intramural data to obtain additional characteristics of the patient's community, such as the demographics, the urban or rural character, and the longitude and latitude for calculations of distance and travel times. AHRQ frequently uses the population ZIP-Code-level counts from Demographic Update Files provided by The Nielsen Company (a vendor that compiles and adds values to the U.S. Bureau of Census data).

During construction of the HCUP State Databases, AHRQ uses the patient's ZIP Code to link to the ZIP Code-based Nielson data to create two derived data elements representing median income categories for the patient's ZIP Code. One data element is based on the distribution of the U.S. population; the other data element is based on the distribution of the population in the

State. For each variable, the four median income categories are designed to be broad enough to protect patient confidentiality. Ultimately, no category contains fewer than two ZIP Codes in a State. The data element with the national income quartiles is included on the restricted-access, public release NIS, KID, NEDS, and NRD. ZIP-Code-based and county-based census data cannot be linked to the restricted-access public release NIS, KID, NEDS, and NRD because neither the ZIP Code or county of the patient or hospital are included in the databases (as of 2012 data).

TECHNICAL SUPPORT TO HCUP USERS

Users of HCUP data, software tools, and products include health services researchers, policymakers, consumers, providers, and other constituent groups. These users have varied backgrounds including public health, health policy, medicine, economics, and other social sciences. They represent a variety of sectors including academia, private industry, the media, and government.

HCUP technical support provides a bridge between the project and its users by facilitating and promoting the use of HCUP data, software tools, and products. This support is intended to increase awareness of the value of HCUP resources, educate individuals on appropriate uses of HCUP data, and showcase the myriad of potential research and policy analysis applications. Technical support to HCUP users assists the public, government, and our HCUP Partners in the following ways:

1. Expands knowledge about HCUP via educational seminars, online tutorials, exhibit booths, presentations, and poster sessions
2. Provides HCUP documentation on the HCUP-US Web site that includes answers to Frequently Asked Questions and detailed methods for using HCUP databases, software tools, linkable files, and HCUPnet
3. Produces a series of descriptive and analytic HCUP reports
4. Identifies peer-reviewed publications that use HCUP resources
5. Maintains a catalog of available HCUP databases and products
6. Provides online information about ordering procedures, requirements for obtaining and using HCUP databases, and methods of acquiring other HCUP products.

The HCUP-US Web site (http://www.hcup-us.ahrq.gov) is integral in providing technical support to HCUP users. Please refer to the HCUP Online Resources section of the HCUP Project Overview Binder for more detailed information about the Web site.

As part of technical support, the Technical Assistance team answers user questions about HCUP databases and the application of HCUP tools and products. Complex questions are answered by senior research personnel trained in epidemiology, health services research, statistics, economics, and medicine. Senior programming staff provide advice on technical issues related to HCUP data and HCUP-provided programs. The Technical Assistance team forwards specific user questions, such as media and interagency requests and high-profile inquiries, to AHRQ staff. The Technical Assistance staff may be reached through a dedicated toll-free telephone number and email address:

- 1-866-290-HCUP
- hcup@ahrq.gov

Messages are reviewed daily, and the Technical Assistance team responds to inquiries within 3 business days.

TECHNICAL SUPPORT FOR HCUP PARTNERS

HCUP is made possible through the voluntary participation of State data organizations, hospital associations, and private data organizations that have partnered with AHRQ.

In addition to the products and technical support that are available to all HCUP users, the Partners are afforded other benefits for their participation in the project. HCUP creates analytic tools, data products, and reports for Partners; provides subject-matter expertise on data issues to Partners; promotes communication and information exchange among Partners about inpatient and outpatient data collection and use; and returns complimentary copies of the HCUP databases to participating data organizations.

For more information on technical support for HCUP Partners, see the technical support section of Benefits of Partnership provided with this Annual Activities Report.

We hope you and your affiliates find this report helpful. AHRQ values the extensive contributions of each HCUP Partner and will continue to seek Partner guidance on the use and development of HCUP data in 2016. We value and welcome your feedback and suggestions. Please contact Jenny Schnaier or Carol Stocks at AHRQ to share your comments or pose questions about the project.

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